

Railway Age Gazette

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
WOOLWORTH BUILDING, NEW YORK.

CHICAGO: Transportation Bldg. CLEVELAND: Citizens' Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....	\$5.00
Canada.....	6.00
Foreign Countries (excepting daily editions).....	8.00
Single Copies	15 cents each

Engineering and Maintenance of Way Edition and four Maintenance of Way Convention Daily issues, North America, \$1.00; foreign, \$2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

WE GUARANTEE, that of this issue 8,150 copies were printed; that of those 8,150 copies, 6,575 were mailed to regular paid subscribers and 345 were provided for counter and news companies' sales; that the total copies printed this year to date were 336,809—an average of 8,863 copies a week.

VOLUME 55.

SEPTEMBER 26, 1913.

NUMBER 13.

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GENERAL NEWS SECTION.....

*Illustrated.

DR. ARTHUR T. HADLEY has been elected a director of the New York, New Haven & Hartford. For years President Hadley has been the profoundest student of railway economics in this country not actively engaged in the management of any railroad property. In 1883, Dr. Hadley was an instructor in Yale University, with no prescribed duties, he began a course of lectures to such students as cared to hear him on some questions involving the economics of transportation. At that time there was then very little literature in English on these subjects. Charles Francis Adams, in the epoch-making early reports of the Massachusetts Railroad Commission, had shown that these questions were complicated and could only be solved by the observation and analysis of facts and the application of economic principles by minds capable of sound reasoning; and the *Railroad Gazette* under S. W. Dunning was endeavoring to find and show

the way to an understanding of the pending questions. The young Yale instructor therefore was asked to present in these columns the conclusions of a mind trained in economic reasoning on questions then agitating the nation. Dr. Hadley was then just beginning his great career, but as the son of the great Greek and English scholar, James Hadley, he found attentive hearers and readers. The series of articles by him, published in the *Railroad Gazette* in the early eighties were afterwards gathered together and, with some additions, published by G. P. Putnam's Sons under the name of "Railroad Transportation, its History and its Laws," which was one of the first of the small library of books on railroad economics published in this country. In addition, President Hadley had, as chairman of President Taft's securities commission, the very valuable opportunity to study at close range and in the broadest possible way the problems of American railroad finance. The addition of such a man to the councils of the New Haven will obviously be of the utmost importance to that property; but the recognition of this fact by the New Haven directors is a real step in advance in the conduct of railroad affairs by those who represent the owners of the railroads. The New Haven board is larger than most railroad boards and has on it an unusually large number of men who represent great wealth, invested not only in many other roads beside the New Haven, but also in other lines of business. The decision of these men to associate with themselves a man noted for his courage and ability to decide questions according to principle and not expediency is a good sign of the times.

IT is well known that the efficiency with which the Baltimore & Ohio is operated has been greatly increased within recent years. We publish on another page an article by C. C. Riley, general superintendent of transportation of that road, which clearly indicates how the increasing efficiency in its operation is being secured. Mr. Riley's article describes the methods that are being used to get better performance from freight cars. These methods, so far as the transportation department is directly concerned, are broadly of two kinds, investigation and supervision. The management first set out to learn what was wrong, and that is the very beginning of the work of increasing efficiency. Having located the shortcomings in methods, it has increased the official staff for the express purpose of correcting the faults detected. All this sounds simple enough. But to actually do the investigating and supervising necessary to make investigation and supervision count on a railway system as big as the Baltimore & Ohio involves a tremendous amount of hard, continuous, detailed work. And it is work of this kind which is imperatively needed in the operating departments of many railways in the United States. There is only one way to get it done, and that is to spend the necessary money for adequate supervision and then insist on supervision being adequate. One of the troubles with many railways is that their managements suffer from the illusion that the money they avoid spending by keeping down their expenditures for supervision actually is saved. The only way to make railway employees worth the high wages that they are now receiving and railway supplies and equipment worth the high prices they now cost is to employ enough capable officers in all the different ranks to get the maximum practicable results from every structure, every unit of equipment, every employee.

OF proposed amendments to the Standard Code of train rules some of the most sensible and most clearly expressed have been those formulated by the committee of the train despachers' association. We had occasion in connection with a former convention (June 28, 1912) to point out this fact, and it was again prominent in the report of the superintendents' convention at Chicago printed August 29, page 374. No one will say that those despachers acquired all their railroad knowledge in an office. But, as befits a true friend of the despachers, we feel bound to register a

vigorous "kick" against their proposal to make a rule directing enginemen to blow whistle blasts of eight seconds each. Have those committee men no friends living in the country, where whistle blasts, even of four seconds, are a great nuisance? In the cities the people repress the railroads, more or less, and unnecessary noise from engines is not so common as it used to be; but dwellers on the prairies deserve some consideration—likewise the passengers in the cars. A car in a train within 150 ft. of the engine is often made a partial bedlam to the passengers riding in it by a thoughtless engineman. And long blasts are not objectionable alone because of the complaints of pernickity neighbors; they are unnecessary from the railroad standpoint. Let any despatcher who has a buzzer at hand use it to make the highway crossing signal as recommended at Chicago, taking about 13 seconds—four, four, two, two; we venture to say that he will recommend any farmer to sell his farm if it is located near a whistling post where such whistle-signals are given frequently—unless the whistles are very soft ones. That is, either sell the farm or reform the railroad. Superintendents who have required the highway signal to be made quickly—all of the four blasts within two seconds—have found decided satisfaction in so doing. Other signals can be reformed with equal facility.

THE recommendation that, where two roads are so near together that the whistle signals may be confused, the code for calling in flagmen shall be enlarged, so as to provide twice as many indications, is another point in the despatchers' conclusions which it is to be hoped will not prevail. Not that we should not take every possible means to preclude confusion; clear instructions must be had at any cost; but an amplified code is likely to cause as much confusion as it cures. The noise nuisance, from the neighbors' standpoint, comes in here, also; but that is not the main reason. A safe rule would be to do as has been done in some cases on four track lines: abolish entirely the use of the engine whistle for calling in the flagman. In the great majority of cases a mouth whistle can, with proper precautions and adjuncts, be made available; and at junctions such as the despatchers have in mind, telephones could in many cases easily be made available. The use of telephones, installed in boxes on posts along the road, is revolutionizing some features of train management, and committees who deal with train rules have a duty to see that the revolution does not proceed so rapidly as to leave them behind. The despatchers are to be commended for their common sense, their insight and their lucid presentation of their views; but their art has the weakness of its defects. They beat the world in doing a delicate business at long range; but if we do everything at long range we shall have to look out or we shall be guilty of as great a noise nuisance as is the coast artillery, when it fires cannon balls at targets six miles out at sea.

WEAK SPOTS IN DISCIPLINE.

QUESTIONS concerning weaknesses in the discipline of trainmen on American railroads and of ways of curing such weaknesses constitute a staple topic for discussion. In a business where so many men are involved, with a multiplicity of bosses and sub-bosses, scattered over a territory extending hundreds of miles and performing exacting and delicate duties, some inefficiency is inevitable. The strict disciplinarian must be a man of vigorous backbone. The greatest weakening influence that haunts the railroad officer is sympathy for the unfortunate and the ignorant. In one aspect of the matter a lack of education or ability on the part of the boss may be looked upon as the chief fault in discipline, as, if he knows his job, he understands the danger of being influenced by sympathy or other unbusinesslike considerations. Undoubtedly, if our superintendents had been

more thoroughly and scientifically trained for their positions, the discipline of their men would be better. The influence of the brotherhood grievance committees weakens discipline many times because the sympathies of the committee men are in line with most of their legitimate arguments. Whether this sympathy of the professional grievers is or is not the worst influence in this department of railroad work, as often appears to be the case, need not be discussed at this time. Evidence of the deplorable fact is not easy to gather, for the officer who allows himself to be overborne by a too strenuous committee naturally conceals or disguises the fact as much as possible, and the committee men, on their part, are only too glad to let it appear that they won their case wholly by legitimate means. Whatever the apportionment of responsibility, the duty, of course, of every railroad officer as well as of every committee man is to act in all cases solely in the interest of the efficiency of the service, for safety and economy and to make the railroad popular with the public. Sympathy must take some other form than that of putting or keeping a man in a position that he is not fit to fill.

A very effective way of inculcating firmness and relegating sympathy to its rightful place would be to publish some of the numerous and instructive incidents of actual life, with which railroad officers are acquainted; and we have made the foregoing observations as an introduction to a statement of two illustrative cases. These are given, by a well known superintendent, as follows:

An engineman against whose record were many debits for trivial acts of carelessness, such as being late in responding to call, running through switches in yards, running over Hayes derails, not cutting the engine off a heavy freight train in taking water, forgetting to examine bulletin boards and register for special orders, was finally dismissed from the service on account of his generally shiftless and careless behavior. After much parleying and many promises of reformation he was reinstated, first having been given a heart-to-heart lecture by the superintendent. A few days after he resumed work he went to sleep while pulling through a passing siding, on single track, and pulled out at the opposite end, in the face of an approaching train; and he was killed in the collision which followed. This was a case of misplaced confidence in the ability of a careless man to reform.

A passenger conductor who had a good record and who had been in the service for thirty years was dismissed for drinking while on duty, this being, so far as was known, his first offense. He stoutly denied that he was in the habit of drinking and maintained that on the occasion in question he had taken blackberry brandy as a medicine and had been overcome by its effect. He had a good reputation in the town where he lived and succeeded in getting letters asking for reinstatement from several clergymen, bank officers and substantial business men who had known him for years. The conductors' committee made a strong plea for leniency, and, considering his previous good record, he was finally reinstated. On the third trip which he made after his reinstatement he again got intoxicated and was again dismissed; and it was then found that he was addicted to intoxicants; and after that he was frequently seen intoxicated on the streets of the town where the clergymen and others had so beautifully eulogized his character and habits. This was a very unusual case of a man beginning the use of intoxicants after leading a temperate life for over fifty years, a case of misplaced sentiment toward a man with a favorable record of thirty years standing, and a previous good reputation as a citizen, but who went wrong in spite of everything.

The first of these two cases is to be classed as a tragedy—is it not? From so brief a statement it is not perhaps fair for either the editor or the reader to draw a final conclusion, but at least we have here a reminder of the elementary lesson that small derelictions surely show the tendencies which

result in larger ones. Nothing is plainer, in a great many cases, than that irrevocable removal from the service is the only suitable punishment for what are called minor offenses. A "promise" of reformation is buried out of sight by the fundamental maxim of human nature that "actions speak louder than words." The second case is one in which a superintendent would be tempted more readily to excuse himself; but the danger of allowing any relaxation of Rule G is well known, and it is safe to say that that particular superintendent, after that case, bore this in mind. False men who have honest (and innocent) friends constitute one of the constant danger points in the railroad officer's scheme of discipline, and the drink habit is one of the things which change honest men into false ones. .

In contrast with these two cases the reader will be glad to see a couple of narratives, with a different ending, which we have received from superintendents A. and B. as follows:

I recall the case of Dickinson, an engineman whom I discharged. This action was taken only after a careful investigation and two hearings, at which three members of the committee were present. Some days after the case was settled these three committeemen came in to see me. At the very outset I asked them to define their attitude. "Do you come here claiming that there has been any element of unfairness or injustice in the decision of this case, or are you here simply because of your sympathy toward Dickinson's wife and children?" "Well," they said, "we thought that in view of —." I interrupted them at once, and repeated my challenge: "What facts or arguments do you wish to present? What flaws do you find in my decision?" Again they began about some alleged principle, as affecting such and such rules; and again I refused to listen; and finally they said that, to be frank, they would have to admit that sympathy

was the whole motive of their visit. They were not prepared to dispute a single point in my decision. "Sympathy," said I, "in a case like this, is a laudable sentiment. You cannot be more truly sorry for this man's family than am I, myself; but the safety of our trains is a matter of cold business, simple devotion to duty and faithful and intelligent carrying out of the rules. In no other way can we think of achieving even a moderate degree of success." And thus the case was settled.

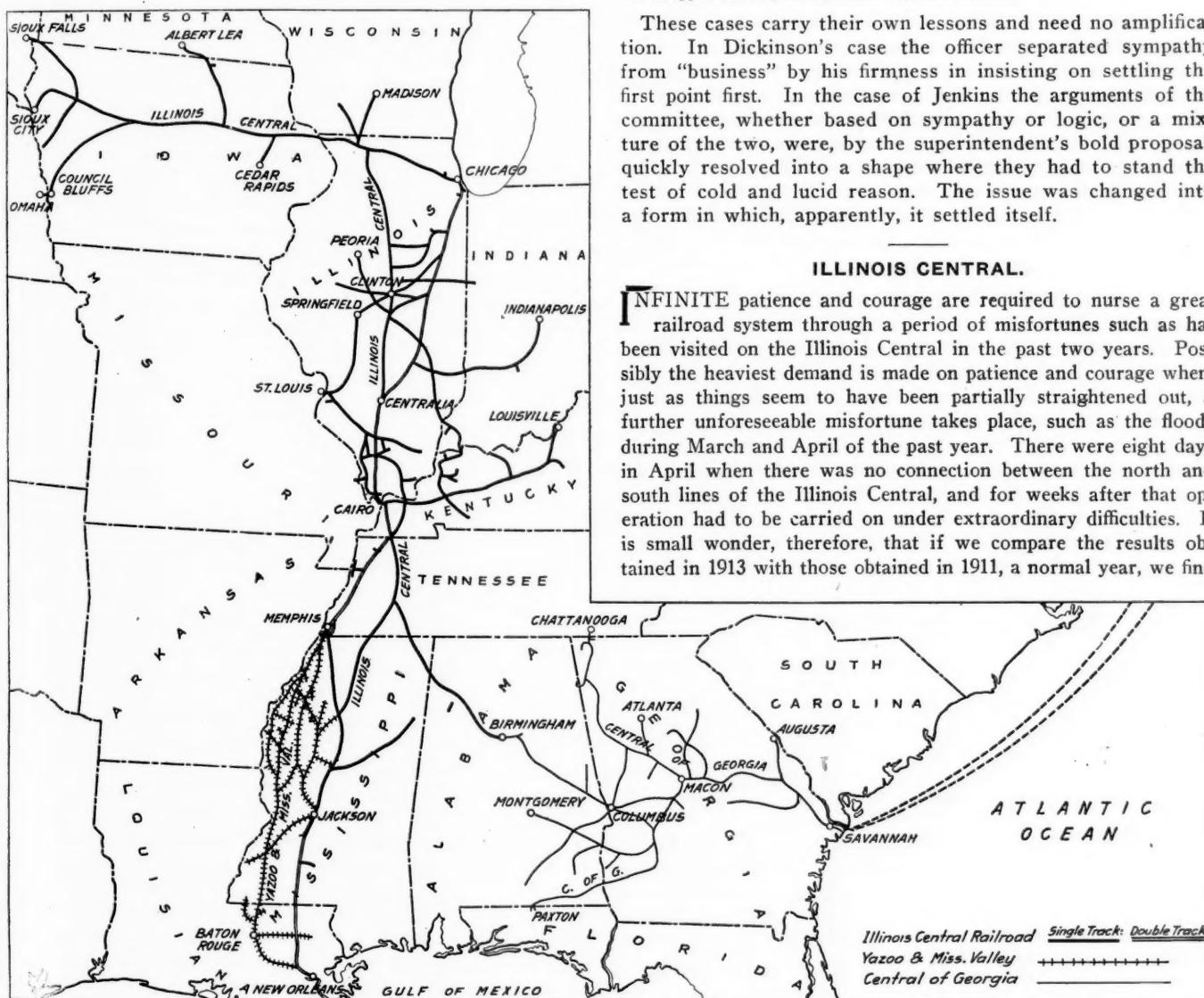
Here is the case of Engineer Charles Jenkins. He was employed as fireman in December, 1902; promoted to engineman June, 1909. His discipline record contains four items, in substance as follows: February, 1910, one demerit mark for allowing injector discharge pipe to freeze and burst, making it necessary to send a relief engine. April, 1910, one demerit mark for derailment of engine. June, 1911, suspended ten days for responsibility for derailment. August, 1911, dismissed from the service for running past signals at a junction.

On the face of it this man's dismissal looks like severe discipline, but he was discharged for being generally incompetent as an engineman, and lacking in judgment and common sense. His discipline record does not show the narrow escapes from accidents which he had. But these narrow escapes were known to the superintendent, and finally that officer refused to take the responsibility of keeping the man in the service any longer. Very serious objection was raised by the committee representing the brotherhood, their position being that the company had no right to discharge a man without just cause; that is to say, until after he had been the cause of a train accident. But the superintendent, backed by his superior, took the position that he should not assume the responsibility of keeping such a runner in the service, it being perfectly evident that the man would have a serious accident, sooner or later. "And," says the superintendent, "I took the position that I did not propose to be accountable after the road foreman of engines and my assistants had refused to do so. The engineers' committee thought this was unfair. Then I offered to keep Jenkins in the service if they would take the responsibility; that is in the only way that they could, namely, if he had an accident, they were to consider themselves dismissed. The result was that the matter was dropped entirely and Jenkins left the service."

These cases carry their own lessons and need no amplification. In Dickinson's case the officer separated sympathy from "business" by his firmness in insisting on settling the first point first. In the case of Jenkins the arguments of the committee, whether based on sympathy or logic, or a mixture of the two, were, by the superintendent's bold proposal, quickly resolved into a shape where they had to stand the test of cold and lucid reason. The issue was changed into a form in which, apparently, it settled itself.

ILLINOIS CENTRAL.

INFINITE patience and courage are required to nurse a great railroad system through a period of misfortunes such as has been visited on the Illinois Central in the past two years. Possibly the heaviest demand is made on patience and courage when, just as things seem to have been partially straightened out, a further unforeseeable misfortune takes place, such as the floods during March and April of the past year. There were eight days in April when there was no connection between the north and south lines of the Illinois Central, and for weeks after that operation had to be carried on under extraordinary difficulties. It is small wonder, therefore, that if we compare the results obtained in 1913 with those obtained in 1911, a normal year, we find



The Illinois Central and Its Atlantic Coast Connection, the Central of Georgia.

that the Illinois Central has not yet regained its lost ground.

The directors showed both courage and wisdom in reducing the annual dividend rate from 7 to 5 per cent., the company paying a total of 6 per cent. in the fiscal year 1913 and earning it. Even so, however, the company's surplus account has been reduced to \$1,996,000, a figure which precludes—until it has been built up again—the possibility of paying dividends even in a period of temporary depression unless they are actually earned.

The recovery in general business and in gross revenue was good when compared with 1912, but when compared with 1911 reflects the abnormal conditions created by the flood. Total operating revenue amounted to \$64,281,000, or \$5,554,000 more than in 1912, and \$2,612,000 more than in 1911. This, of course, is by no means a normal increase for two years for a road like the Illinois Central, but probably will not compare unfavorably with the gain over the 1911 showing made by other roads that were affected by the flood.

Expenses, of course, were far higher in 1913 than in 1911, and were some higher than in 1912. From the table at the end of these comments it will be seen that the bulk of the increases in expenses occurred in expenditures for maintenance of way and for transportation. The total of all freight carried one mile increased 17.44 per cent. in 1913 over 1912, but only 8.3 per cent. over 1911; while transportation expenses were between 13 and 14 per cent. greater in 1913 than in 1911. Almost every single primary account under transportation expenses shows considerable increases in 1913 over 1911, but by far the greatest proportionate increases in cost are the yard expenses.

When we stop to recall that the main double track lines of the Illinois Central are worked more nearly to capacity, probably, than any other so great a mileage, with the exception of the Pennsylvania Railroad, the wonder is that the total break-in-two of these lines for ten days did not create far worse confusion and add far more to yard and other expenses than was actually the case. The explanation, of course, is that the operating force of the road simply lived 24 hours a day on the job during the flood period, and they refused traffic when they could not handle it. This also explains why the increase in total operating revenues was not as great as might have been hoped for.

This is the dark side of the picture. June, 1913, earnings were the best June earnings in the history of the company. The directors have stood behind the management; the management has steadily stuck to its guns; \$8,000,000 was raised through the sale of equipment trust certificates for the purchase of new heavy modern locomotives and large capacity freight cars; lighter power and light cars that had probably been worked through the strike period, with just the bare repairs necessary to keep them going, have been scrapped; and despite congestion, floods, and the inevitable difficulties of holding an organization together after a great strike, the company has increased its train load and at least lived up to its own high standard of maintenance.

In 1913 the average train load of revenue freight was 407 tons, and of all freight, 482 tons. This compares with a revenue train load in 1912 of 356 tons, and in 1911 of 358 tons; and with a total train load of 427 tons in 1912 and 430 tons in 1911. Car loading averaged 22.82 tons per loaded car, as against 21.52 in 1912, 21.91 in 1911 and 21.96 in 1909. Revenue freight train miles increased but 4.08 per cent. over 1912, with an increase of more than 17 per cent. in ton mileage carried; and the number of loaded cars per train mile increased 6 per cent.

Last year 349 miles of electric automatic block signals were installed on the Illinois Central. More than 11 per cent. of all ties in track, including sidings, were renewed.

The Illinois Central has had for a number of years an unusually high credit, and while the troubles that the road has had to contend with in the past two years and the resulting decrease in the dividend rate have reduced the price at which Illinois stock is quoted, it is general money conditions rather than anything peculiar to the Illinois Central situation that has prevented the company from doing necessary long-term financing. At the end of 1913 the company had on hand \$2,234,000 cash, with \$23,751,-

000 of its own securities in its treasury. Total working assets were \$43,320,000 and total working liabilities, \$16,458,000. The working liabilities include \$6,500,000 loans and bills payable, the increase during the year in this account being \$600,000.

The following table shows the principal figures for operation in the fiscal year ended June 30, 1913, as compared with 1912:

	1913.	1912.
Average mileage operated.....	4,763	4,763
Freight revenue	\$45,589,299	\$37,881,766
Passenger revenue	13,455,884	13,337,562
Total operating revenues.....	64,280,903	58,727,272
Maint. of way and structures.....	8,519,025	7,691,215
Maint. of equipment.....	13,952,654	13,857,549
Traffic expenses	1,320,583	1,400,942
Transportation expenses	24,743,324	23,653,249
General expenses	1,513,325	1,518,512
Total operating expenses.....	50,048,912	48,121,467
Taxes	2,903,551	2,685,730
Operating income	11,250,848	7,812,719
Gross income	17,250,200	12,183,478
Net income	6,575,113	3,466,448
Dividends	6,557,760	7,650,720
Surplus	17,353	*4,184,272
*Deficit.		

CHICAGO & NORTH WESTERN.

ONE of the easiest ways for a railroad management to make a good showing is to have a comparison made with a previous poor showing, but the history of the Chicago & North Western definitely precludes the management from making a showing in this way. The substantial gain in gross, the smaller per cent. spent for transportation expenses, and the larger surplus earned in the fiscal year ended June 30, 1913, may, therefore, be taken at their full value. After the payment of 8 per cent. on the preferred stock and 7 per cent. on the common stock there was a surplus of \$3,775,000 in 1913, as compared with \$568,000 in 1912.

The Chicago & North Western operates nearly 8,000 miles of road. It has been called the Pennsylvania of the West, but this implied comparison is suggested rather by the standards of North Western service than by any similarity between the character of traffic or physical characteristics of the plant or density of traffic, except on the main lines of the North Western.

The North Western has a very large proportion of branch line mileage. It is a granger road, earning on an average about \$10,000 a mile (\$10,413 in 1913 and \$9,378 in 1912). The company does not show the tonnage of various classes of commodities in its annual report. The following figures are taken from its reports to the Interstate Commerce Commission for 1912, total tonnage, 37,265,642. The per cent. of each class of commodities is as follows:

Ores	19.27 per cent.
Bituminous coal	14.54 per cent.
Lumber	13.74 per cent.
Stone and sand	7.86 per cent.
Grain	7.63 per cent.

While, of course, there is not a large percentage of low grade tonnage, and we would not expect to find a very heavy train load, yet on the other hand, the Union Pacific and the Hill lines have considerably heavier train loads than the North Western. There are two explanations of this. The North Western, having such a large proportion of branch line mileage, would have a comparatively low average train load, even if it had developed very heavy train loads on main line traffic. As a matter of fact, however, the North Western's chief aim has not been so much the development of very heavy train loads as the development of business through good service.

An annual report does not reflect, except negatively, such a policy as this of the North Western. Such a policy, however, is of the utmost importance not only to the people who are served by the road, but, in the long run, to the road's security holders. With freight rates between competitive points necessarily the same on different roads, and where there is no competition, with railroads so largely at the mercy of local regulative and legislative bodies, the amount of traffic that a road can secure and its opportunities for development—comparatively unhindered by local hostility—depend to a very great extent on the

quality of the service rendered. The Chicago & North Western's enviable position and earning power are undoubtedly in a very considerable measure due to the pursuance of a fixed policy extending over a number of years of placing service on a par with economy.

The Chicago & North Western carries 731,000 ton miles per mile of road and 140,000 passenger miles per mile of road. Its revenues per unit of service are fair but not large. In 1913 the average revenue per ton per mile was 8.7 mills, comparing with 9.1 mills in 1912, and its average passenger rate was 1.85 cents in 1913 and 1.81 cents in 1912. The average haul of freight was 140 miles in 1913 and 138 in 1912.

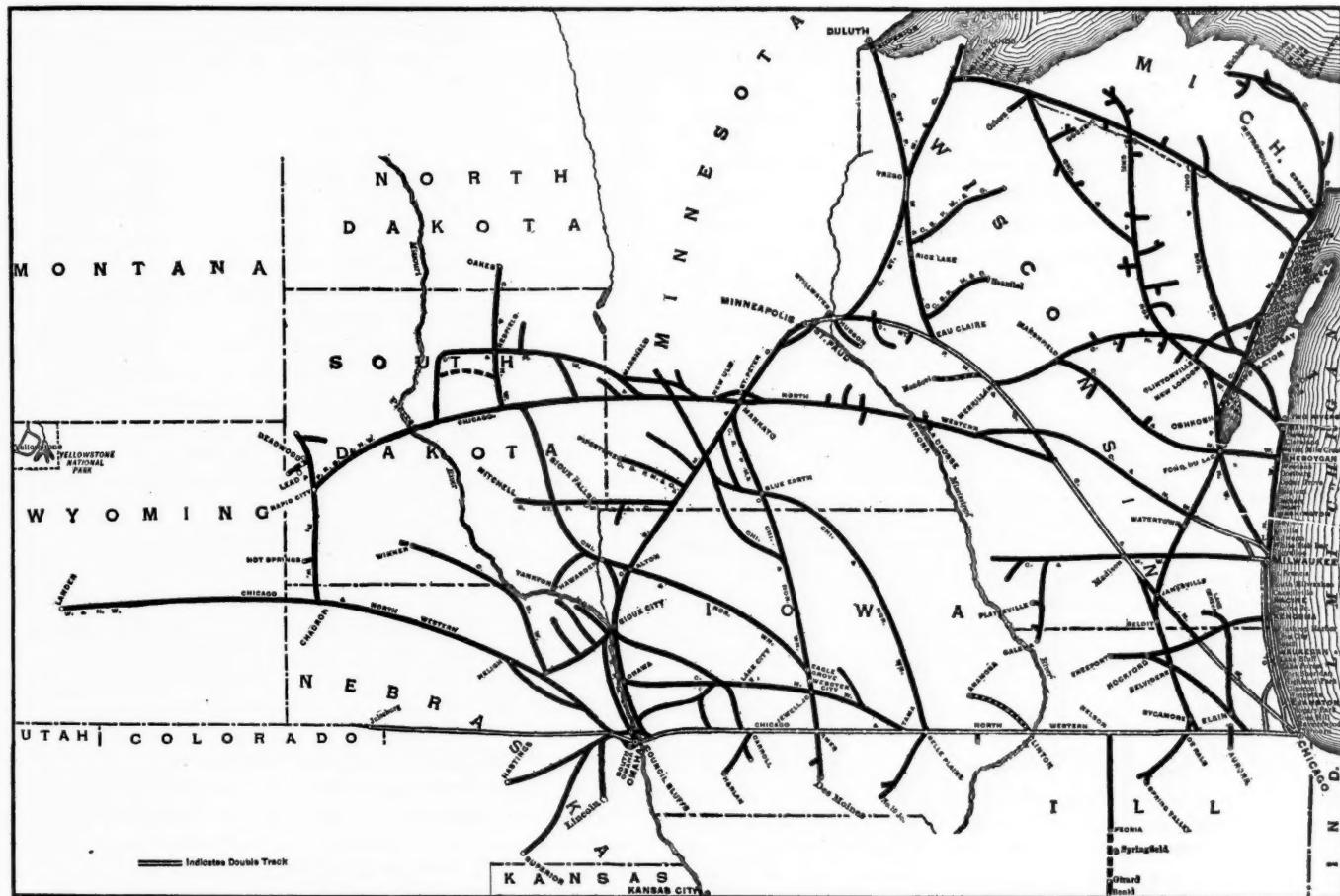
The average train load for the whole road in 1913 was 348 tons. This is an increase of 16 tons over 1912, which is noteworthy. Put in another way it is even more striking, possibly. The total tons of freight carried one mile amounted to 6,282,900,000, an increase over 1912 of 22 per cent. The mileage of

following table shows the ratio of each class of expenses to total operating revenues:

	1913.	1912.
Maintenance of way and structures.....	13	12
Maintenance of equipment	13	12
Transportation expenses	1.6	1.8
Traffic expenses	38	41

Maintenance of way expenses were particularly heavy because the company did a good deal of renewal work. Light rails were replaced with heavier rails on 559 miles of track, the total cost of replacing in kind, of course, being charged to maintenance; the occasion of the replacement of these rails was used to strengthen ballast, renew ties, replace wooden structures with fills or culverts, and to generally bring the roadbed up to the standard. The wooden structures replaced by permanent work aggregated 6,243 ft.

Details of some of the betterment work and especially of extensions are mentioned in our construction columns, and in this



The Chicago & Northwestern System, Including the Omaha.

freight and mixed trains amounted to 18,056,000 in 1913, an increase of but 4.88 per cent. The average car loading per loaded car was 18.38 tons in 1913, an increase of 8.95 per cent. This is a substantial increase, but, on the other hand, there was a rather wide field for improvement.

Total operating expenses in 1913 amounted to \$58,253,000, which is greater by \$5,551,000 than the 1912 operating expenses. Of the increase, however, \$2,132,000 was in maintenance of way, \$1,999,000 in maintenance of equipment and but \$1,316,000 in transportation expenses. Thus in 1913 the company spent 19.74 per cent. of the total operating expenses for maintenance of way, 19.86 per cent. for maintenance of equipment and 55.35 per cent. for transportation expenses, while in 1912, 17.78 per cent. was spent for maintenance of way, 18.16 per cent. for maintenance of equipment and 58.68 per cent. for transportation expenses. The

connection it is worth noting that considerable progress was made with the installation of block signals. When the work now in progress is completed, 957 miles of road on the North Western will be equipped with automatic signals. The company is also installing telephones for train despatching and in a comparatively short time will have 2,173 miles of road so equipped.

The only capital securities that were issued during the year were \$5,700,000 equipment trust certificates, \$2,500,000 Des Plaines Valley bonds assumed and \$1,120,000 St. Paul Eastern Grand Trunk bonds assumed, the net increase in bonds outstanding being \$9,180,000. During the year there was an increase of \$1,138,000 in bonds held in the treasury, this amount having been certified by the trustee and turned over to the treasurer in exchange for bonds retired and for construction expenditures.

At the end of the year the North Western had on hand \$9,-

647,000 cash, with total working assets of \$46,189,000, against which there were working liabilities of but \$10,420,000. The North Western includes under its working assets \$10,337,000 Chicago, St. Paul, Minneapolis & Omaha stock, which might apparently more properly be included under investments, since it is hardly likely that the North Western would consider any sale of its controlling interest in the Omaha.

The following table shows the principal figures for operation in 1913 as compared with 1912:

	1913.	1912.
Average mileage operated.....	7,974	7,859
Freight revenue	\$54,661,588	\$46,691,540
Passenger revenue	20,557,623	19,555,567
Total operating revenues	83,035,921	73,698,592
Maint. of way and structures....	11,501,186	9,368,721
Maint. of equipment	11,568,496	9,569,853
Traffic expenses	1,348,982	1,340,086
Transportation expenses	32,241,258	30,924,938
General expenses	1,592,858	1,498,245
Total operating expenses	58,252,780	52,701,843
Taxes	3,597,160	3,422,838
Operating income	21,197,277	17,540,872
Gross income	24,660,769	20,922,766
Net income	14,875,013	11,724,540
Sinking fund	199,991	257,209
Dividends	10,899,615	10,899,615
Surplus	3,775,408	567,716

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.

THE Chicago, St. Paul, Minneapolis & Omaha operates 1,747 miles of road in Wisconsin, Minnesota, Iowa, South Dakota and Nebraska. Of this mileage 157 miles is double track. The road has a bonded debt of but \$22,400 per mile, and there is outstanding \$29,819,000 stock, of which the Chicago & North Western owns \$14,920,000. Dependent as it is for traffic very largely on products of agriculture, and supplies and manufacturers shipped in to the agricultural communities which it serves, the Omaha's prosperity is governed from year to year by the crop conditions in its territory.

In the fiscal year ended June 30, 1913, crops throughout the states served by the Omaha were fairly good and compared very favorably with the poor year 1912. The Omaha earned in 1913 \$16,993,000, as against \$15,135,000 in 1912. Operating expenses amounted to \$11,887,000 last year, as against \$10,466,000 the year before. The operating ratio, therefore, was 69.95 in 1913 and 69.15 in 1912.

The total ton mileage of freight carried in 1913 was 1,263,000,000, an increase of 15.64 per cent. The amount received per ton per mile, however, decreased from 8.7 mills in 1912 to 8.6 mills in 1913.

The Omaha was able to show a larger average train load and better car loading not only when compared with 1912, but also when compared with 1911. The train load in 1913 was 276 tons; in 1912, 249 tons, and in 1911, 274 tons. The carload per loaded car was 18.99 tons in 1913, 17.62 tons in 1912 and 17.33 tons in 1911.

Like the North Western, the Omaha spent considerably more for maintenance in 1913 than in 1912. For maintenance of way and structures the Omaha spent \$2,208,000, an increase over 1912 of \$524,000. The largest single increase was in the expenditure for ties, on which nearly twice as much was spent in 1913 as in 1912. There was also, of course, more spent for roadway and track, and there was \$99,000 more spent on bridges and \$69,000 on buildings. Maintenance of equipment in 1913 cost \$2,189,000, an increase over 1912 of \$392,000, the largest single item of which was the amount spent for freight train car repairs.

At the end of 1913 the company had on hand \$2,413,000 cash, with total working liabilities of \$2,771,000. Working assets, in which the Omaha includes its own preferred and common stock in the treasury and bonds of the Minneapolis Eastern, totaled \$9,619,000. During the year there was \$2,500,000 debenture bonds sold, and the company spent a total of \$4,336,000 for additions and betterments and new equipment.

The following table shows the principal figures for operation in the fiscal year ended June 30, 1913, as compared with 1912:

	1913.	1912.
Average mileage operated.....	.....	.....
Freight revenue	\$10,857,207	\$9,478,792
Passenger revenue	4,984,595	4,551,594
Total operating revenues.....	16,993,005	15,135,426
Maint. of way and structures....	2,208,294	1,684,728
Maint. of equipment	1,188,946	1,796,694
Traffic expenses	348,515	320,889
Transportation expenses	6,746,792	6,283,268
General expenses	394,915	380,637
Total operating expenses	11,887,461	10,466,216
Taxes	832,263	782,846
Operating income	4,268,469	3,881,631
Gross income	4,504,272	4,122,304
Net income	2,278,933	2,084,603
Dividends	2,086,910	2,086,910
Surplus	*2,302	192,023
*Deficit.		

NEW BOOKS.

Foreign Markets for Railway Supplies and Equipment. Size 6 in. x 9 in.; 224 pages. Published by the Bureau of Foreign and Domestic Commerce, Washington, D. C. Price 25 cents.

This book will be found invaluable by the exporter of railway materials and should do much to widen the market for American products of this nature. Hitherto manufacturers have been greatly handicapped by the lack of knowledge of foreign market situations and the difficulty of reaching the proper railway officers. This book treats every country in the world separately and gives the most valuable information regarding each. This information includes a list of the railways of the country, both in operation and under construction, together with the names and addresses of the officers in charge of purchases; facts and figures regarding the amount and types of rolling stock in service; facts regarding the local construction and purchase of equipment; mention of the countries from which equipment is imported; and statements regarding the opportunity for American exporters.

Rules of Management. By William Lodge, president of the Lodge & Shipley Machine Tool Company. Bound in cloth. 140 pages. 5 in. x 8 in. Published by the McGraw-Hill Book Company, 239 West 39th street, New York. Price \$2.

In his foreword, Mr. Lodge states that when he decided to relinquish the active management of the Lodge & Shipley Machine Tool Company and let a younger generation take up the reins, he realized what would probably happen if he simply handed them over to others who had never learned how to drive. He therefore endeavored to see what could be done to prevent the immediate development of a new set of conditions with which the organization he had built up would not be able to cope. In carrying out his plan of teaching his subordinates to handle things, the record of his personal experience, put in the form of rules and comments, was printed for the information of the succeeding manager of the shop. This work is the result of the desire to give in a permanent written form a knowledge of facts and schemes of organization that would enable the next manager to carry on his work with a feeling that he was on sure footing. These instructions may also be found applicable in many lines of machine building, and they have therefore been printed for general distribution. In this book the duties and work of each department are outlined in some detail and there are separate chapters for each class of employees from the general manager to the janitor and watchman. These rules and instructions throughout are excellently worded, are filled with common sense and are thoroughly practical in their application. Although intended for the machine building industry the principles of good management in the abstract are so well understood and have been so thoroughly interwoven throughout the whole series of instructions that they are applicable to practically every manufacturing activity.

INCREASING FREIGHT CAR PERFORMANCE.

Methods of Investigation and Supervision Being Used on
Baltimore & Ohio to Reduce Expenses and Increase Results.

By C. C. RILEY,

General Superintendent of Transportation, Baltimore & Ohio.

In a most complete and comprehensive paper Mr. L. F. Loree has given the distribution of time of a typical freight car movement, showing that the average trip of a freight car consumes nearly fifteen days, of which the railroad is responsible for 63.7 per cent. and the shipper for 36.3 per cent. Others have enumerated the principal things that slow up car movement. Circular No. 1316 of the American Railway Association contains eight timely suggestions toward securing increase of available car supply. This article deals briefly with methods already in successful operation on the Baltimore & Ohio Railroad for reducing delays to cars and increasing car performance.

The generally accepted unit of measure of car performance is the average miles per car per day. It should be remembered, however, that this unit of measure can be used properly only in comparison of operations of a road with itself. On account of conditions surrounding each road's operations a comparison of one road with another is unreliable and of no great value. The chief factor in determining the average miles per car per

each grand division and each official interested in any way is required to have one in his possession.

In order to determine progress a weekly car location statement is made showing the number of each class of system cars and of foreign cars on each division. Comparison is made of cars on hand with business done to determine roughly if too many cars are in the possession of any division.

A statement showing the performance of the individual division is prepared each week and furnished to all operating officials from the general manager to the trainmaster. This statement shows for each division its best previous performance, together with performance for the current period. It also shows car miles, car days, per diem and what saving would have been effected had the best performance been maintained. Since this report was put into use the efforts of the several divisions have been greatly stimulated; several divisions have exceeded their best previous records. A copy of the report for divisions of dissimilar traffic conditions is given below:

Divisions.	Period.	Avg. miles per day.	Percentage of maximum avg. miles per car per day.	Car miles.	Car days.	Per diem.	Had maximum performance been maintained per diem would have been		Per diem loss due to slower movement
							Days.	Amount.	
A	Nov., 1912	56.4							
	July, 1913	48.1	85.3	3,192,123	66,377	\$29,869.65	56,598	\$25,469.10	\$4,400.55
	Aug., 1913	50.8	90.1	3,314,152	65,228	29,352.60	58,762	26,442.90	2,909.70
B	Jan., 1913	15.9							
	July, 1913	15.4	96.9	4,764,323	308,926	139,016.70	299,643	134,839.35	4,177.35
	Aug., 1913	16.3	102.5	5,050,455	309,078	139,085.10	317,639	142,937.55	*3,852.45
C	April, 1912	67.7							
	July, 1913	64.8	95.7	13,245,571	204,396	91,978.20	195,651	88,042.95	3,935.25
	Aug., 1913	64.9	95.9	14,463,951	223,010	100,354.50	213,648	96,141.60	4,212.90
D	Feb., 1913	14.1							
	July, 1913	11.3	80.1	2,454,292	216,033	98,114.85	174,063	78,328.35	19,786.50
	Aug., 1913	11.3	80.1	2,678,298	236,040	106,218.00	189,950	85,477.50	20,740.50

*Gain. Best previous record underscored.

day is the average haul of the loaded car. The road with a long average haul should have a high average car performance, whereas the road with a short average haul will have a low car performance. Roads with high average miles per car per day do not necessarily render the most efficient service. Frequently a road with a low average mileage per car per day does better than a road with higher average mileage per car per day. Some of the potent factors which retard car movement are demurrage, average haul, reconsignments, minimum load, industrial switching. An increase in industrial switching decreases average miles per car per day, as cars so handled are not credited with mileage.

A CAMPAIGN OF EDUCATION AND SUPERVISION.

In order to secure better performance the Baltimore & Ohio has entered upon a campaign of education and supervision covering not only specific handling of cars, but of transportation matters generally. At stated intervals line officials, including assistant superintendents and trainmasters, come to the general office and are given several weeks' special instruction. They are drilled in detailed workings of the transportation and accounting departments. The reasons for doing things in certain specified ways and the disposition made of various reports prepared on the division are explained. During their stay talks are given them by officials of the operating, accounting and signaling departments. Division officials who have had the advantage of these instructions render more efficient service.

For each ten day period a car bulletin is issued showing the general trend of business, the demand for each class of cars and how surplus cars should be handled. A bulletin is made for

Wrong conclusions and improper action frequently result from incorrect reports. To insure against this, reports received from divisions and grand divisions are carefully checked periodically in the transportation and record offices to determine their accuracy.

ENLISTING ASSISTANCE OF SHIPPERS.

Car supply has been materially increased by enlisting the assistance of shippers. The attention of patrons is called to delays in loading and unloading when greater than the average. This is usually done by letter and it is believed great good has resulted therefrom. Patrons as a rule respond to appeals of this kind. Their assistance is further solicited through visits and letters. Operating officials are urged to keep in personal touch with the patrons of the road, as more can be accomplished thereby. Several times during the season individual letters are written to the heaviest users of cars. The latest one reads as follows:

In order to minimize the effect during the coming fall of impending car shortage, the earnest support of patrons is solicited. Everything possible will be done by the railroads to lessen the effects of car shortage, but the full measure of efficiency cannot be secured without the help and hearty co-operation of car users.

As has been demonstrated by experience, car supply can best be conserved by unloading and loading cars promptly and notifying the agent immediately when this is done; by ordering empty cars as far in advance as possible and also specifying destination and route of shipment; by ordering only cars actually required for immediate loading; by loading cars to full carrying capacity; by loading cars in such manner as will avoid necessity for trimming, readjustment or transfer of lading enroute; by loading individual cars to points specified when order is placed for cars; by limiting the use of reconsigning privilege; by arranging for acceptance of freight immediately upon arrival at destination.

A car shortage is detrimental to the interests of both patron and railroad. Will you not kindly lend your efforts to secure the greatest possible use from available equipment?

It is felt that the Baltimore & Ohio has done its share in providing equipment for increasing business. Since January, 1910, 664 locomotives and more than 29,000 freight cars have been bought.

While the axiom "The time to move a train is when there is a train to move" has not been realized, the policy of the management is to that end. This axiom is just as applicable to yard as to road movement. In many large yards night pick-up trains could be used to advantage to move cars unloaded during the day and to place cars for next day's loading and unloading. A great stride would be made in eliminating car shortages if the best possible movement were given cars in yards.

Car shortages are frequently caused by unwarranted hoarding of cars for anticipated future requirements. This action is rarely justified except on the heavy originating lines. The greatest shortages often occur with the largest number of cars on line and the greatest efficiency is usually secured when the fewest cars are available. A large road in the Southwest maintains a car shortage during periods of heavy demand and thereby secures its best car performance. Transportation officials should have no hesitancy in disposing of cars not actually needed for the handling of business. The presence of unnecessary cars on a road invites relaxation of effort. If a road requiring 50,000 cars to do its normal business had 100,000 cars on hand the greater part of the 100,000 cars would be considered necessary and reduction of that number to 75,000 cars would cause a shortage until there was a readjustment of conditions. A further reduction to 50,000 cars, the number actually needed, would cause another shortage which would last until conditions were adjusted. Greater economy of operation and efficiency of service can be secured by handling fewer cars more promptly.

In figuring on successful operation it is presupposed that a sufficient amount of power is in good order and that track is in first-class condition. These two things are essential. Contingencies often arise which make it necessary to borrow from the future, but this procedure is costly. Equipment should be ready before the beginning of the maximum fall business, and the number of bad order cars should be kept as near 3 per cent. of the total cars on line as is possible. When the heavy traffic season is entered upon without proper preparations being made as regards power, cars and track, the conditions are difficult to overcome during that season.

In former years many cars were rejected as unfit for loading because of alleged defects. Last fall at the beginning of the grain movement nearly half of the cars offered for grain loading were rejected. Proper education of both shippers and railroad inspectors, and the liberal use of lumber for repairs and of paper or muslin for lining, resulted in the acceptance of more than 90 per cent. of cars previously classed as rough box and unfit for grain.

Decided progress has been made in solving the company material question. On the Baltimore & Ohio it is required that company material shall be unloaded within 48 hours, and this is done except in unusual cases.

POSITIONS CREATED TO INCREASE SUPERVISION.

To produce greater transportation efficiency two positions were created, namely, supervisor of transportation and supervisor of terminals. Supervisors of transportation are selected by the general manager and report to the general superintendent of transportation. Other things being equal supervisors of transportation are chosen from subordinate officers previously selected for advancement. These positions have the greatest educational advantages and are broadening in their administration; a year's experience to one of the proper mental makeup produces an ideal superintendent. It is intended as far as possible to give future superintendents the benefit of this training. As transportation is the big end of operation it is important that officials who handle the details should have proper transportation train-

ing and be in full accord and sympathy with the desires of the management. The best results cannot be secured without intelligent support of the division officials.

A supervisor of transportation with the necessary assistants is assigned to the territory of each general superintendent and to all practical purposes is a member of his staff, performing any duty of a transportation nature. In general, the duty of the supervisor of transportation is to supervise all matters pertaining to transportation and to study the needs of his territory with a view of improvement. Matters needing correction are taken up with proper local officials or with the general superintendent. Supervisors of transportation being men of high grade are available for emergencies. The specific duties performed by themselves and assistants are as follows:

1. Check of Division:
 - (a) Car delays including cars loaded with company material.
 - (b) Proper use of cars.
 - (c) Proper handling of 1. c. 1. freight and freight house accumulations.
 - (d) Making of correct reports.
2. Check of Yard Conditions:
 - (a) Congestions.
 - (b) Waybill boxes.
 - (c) Handling of home route cards and empty car waybills.
 - (d) Making of on-hand reports to see that they are complete and all cars accounted for.
 - (e) Making of correct reports.
3. Operation of pick-up and local trains for proper method of handling cars and freight.
4. Check of Division Car Distributor:
 - (a) Proper handling of cars.
 - (b) Check of on-hand reports.
 - (c) Comparison of telegraphic car report, empty car interchange report, telegraphic loading report and on-hand report.
 - (d) To see if car distributor is overworked or assigned duties not properly his.
 - (e) Making of correct reports.
 - (f) Check car order book.
5. To ascertain if trainmasters, assistant trainmasters, yardmasters and yard clerks have copies of current car bulletins.
6. To keep in close touch with officers of divisions and grand districts.
7. Special duties that may be assigned.

Supervisors of terminals report to the general manager and exercise advisory supervision over terminals. When assigned to a particular place upon request of the general superintendent they are given power to act. This position was created as an experiment. The results so far obtained have justified the experiment. It is from the yards that the greatest results must come. Probably the majority of large terminals in this country are inefficiently operated because of lack of proper information and supervision, which are the essence of operation. Without them there are no such things as efficiency and economy. But how few yards have them! At the present time the details of a scheme for destination classification are being worked out whereby at classification yards selected, cars are switched into solid trains for specific destinations and handled with decreased cost and increased efficiency.

IMPROVING YARD OPERATION.

Sufficient serious thought has not been spent on the improvement of yard operations, and the real advances have been few. The standards and working conditions of yardmasters and yard clerks have changed but little in the last twenty years. If efficiency were made the chief goal to be attained the methods of yard operation would soon be revolutionized.

The yard audit has been used to good advantage in yards performing below normal. It is difficult to demonstrate to yard officials that their operations are not good. This can soon be done by the yard audit. These audits cover weekly periods and show detentions due to patrons as well as transportation delays. Frequently these figures are questioned where they show bad

conditions. In such cases all data are turned over to the division officials to check. The operation of the yard audit for several weeks usually results in a noticeable improvement in reduction of delays.

Through a weighing bureau established a few years ago weights of practically all carload freight are secured. Through close watching of scale reports and the taking up with shippers of all cases of loading under carrying capacity of cars a great saving has been effected in equipment. About two-thirds of the tonnage of this road is coal. To overcome the difficulty heretofore experienced of overloading cars with coal of high specific gravity and underloading cars with coal of low specific gravity a chart is now in course of preparation for the benefit of shippers, showing the capacities in pounds and cubic feet of all classes of cars used; weight of coal per cubic foot from each district; and amount of lading needed to insure full carrying capacity. Some grades to secure full tonnage need only to be loaded level full; other grades need to be loaded only slightly above level; in the lighter grades it is necessary to pile to fullest extent to load to carrying capacity.

LOADING OF MERCHANDISE CARS.

Prior to 1910 too many merchandise cars were lightly loaded. Through a reform instituted that year loading of this class of cars was increased 40 per cent. in a little over three years. About a year ago the following methods were prescribed for the handling of l. c. l. freight:

1. The regardless-of-quantity cars was abolished.
2. A minimum of 10,000 lbs. was established for cars loaded on a division destined to stations on other divisions.
3. A minimum of 5,000 lbs. was established for cars loaded on a division to stations on same division.

4. Way-cars in local freight trains are handled without minimum. A campaign for improved handling of l. c. l. freight resulted in a saving of nearly 65,000 box cars during the six months' period ended March, 1913. These 65,000 cars enabled the Baltimore & Ohio to handle business which it otherwise could not have handled. As a result this road passed through a very heavy traffic period with practically no loss of business requiring box car equipment. A supervisor of transportation has been assigned to the study of the handling of l. c. l. freight with a view of giving better service, using fewer cars and effecting economies. Great results are anticipated from this bureau, but as Rudyard Kipling would say, that is another story.

SPECIFICATIONS AND RULES FOR DOUGLAS FIR CAR MATERIAL.

The grading committee of the West Coast Lumber Manufacturers' Association recently met to consider recommendations for changes in the grading rules. The matter of a change in the rules governing car material was carefully considered and the following rules were adopted by the association to supplement all other commercial grading rules on car material:

GENERAL INSTRUCTIONS FOR GRADING.

1. All lumber is graded with special reference to its suitability for the use intended.
2. With this in view, each piece is considered and its grade determined by its general character including the sum of all its defects.
3. The defects in lumber are to be considered in connection with the size of the piece, and for this reason wider and longer pieces will carry more defects than smaller pieces in the same grade.
4. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or mill work will prohibit an inspection for the adjustment of claims except with the consent of all parties interested.
5. A shipment of any grade must consist of a fair average

of that grade and cannot be made up of an unfair proportion of the better or poorer pieces that would pass in that grade.

6. All dressed lumber shall be measured and sold at the full size of rough material used in its manufacture.

7. All lumber 1 in. or less in thickness shall be counted as 1 in. thick.

8. All car material must be shipped in lengths specified or multiples thereof.

9. On all 1 in. D. & M., tongue must not be less than 3/16 in. wide.

10. Defects in rough stock caused by improper manufacture and drying, will reduce the grade, unless they may be removed by dressing such stock to standard sizes.

11. On clear strips, if sold in the rough dry, thickness must not be less than 1/16 in. over the finished size, nor width less than 5/16 in. less than the rough size; if green, not less than 1/16 in. under the rough size in thickness, and 3/8 in. less in width than the rough size.

12. All select common and common sold in the rough must be sawn full to sizes ordered, but natural shrinkage in transit shall not be considered a defect. Sizes under 6 in. in width shall measure full when green, and not more than 3/8 in. scant when dry or part dry. Sizes 6 in. to 12 in. in width shall measure full when green and not more than 3/4 in. scant when dry or part dry. Sizes 13 in. to 16 in. in width shall measure full when green and not more than 3/8 in. scant when dry or part dry.

13. 1 x 4 and 6 in. strips ordered S2S or S2S1E for re-running shall measure not less than 3/8 in. scant in width and 3/16 in. in thickness.

STANDARD LENGTHS.

14. Car siding—8, 9, 10 and 12 ft. or multiples.
15. Latitudinal roofing—5 and 6 ft.
16. Car lining and longitudinal roofing—8, 9, 10, 12, 14, 16, 18 and 20 ft. or multiples of 10 ft. and under.
17. Car decking—9 and 10 ft. or multiples.
18. All orders shall be shipped in the standard lengths called for, unless otherwise specified, but no lengths of car siding, lining or roofing shall be shipped except in the length specified or multiples thereof. Those who do not desire stock shipped in the multiple lengths should so specify. Fractional lengths are figured at the next longer standard length.

DEFECTS.

19. Recognized defects are knots, knot holes, splits, checks, wane, rot, rotten streaks, pin and grub worm holes, dog and pickeroon holes. Pitch seams or shakes, pitch pockets, chipped, torn and loose grain; solid pitch, stained heart, sap stain and imperfect manufacture.

KNOTS.

20. Knots shall be classified as pin, small, standard and large as to size; round and spike as to form; and sound, tight, loose and rotten as to quality.

21. A pin knot is not over 1/2 in. in diameter.
22. A small knot is not over 3/4 in. in diameter.
23. A standard knot is not over 1 1/2 in. in diameter.
24. A large knot is any size over 1 1/2 in. in diameter.
25. A round knot is oval or circular in form.
26. A spike knot is one sawn in a lengthwise direction.
27. A sound knot is red and its fiber must be closely interwoven with the grain of the wood.
28. A tight knot may be either red or black and is so fixed by growth or position that it will retain its place in the piece.
29. A loose knot is one not held firmly in place by growth or position.
30. A rotten knot is one not as hard as the wood it is in.
31. The mean or average diameter of knots shall be considered in applying or construing these rules.

SAP.

32. Bright sap shall not be considered a defect in any of the grades.

33. Sap stains shall not be considered a defect in any grade below No. 2 clear.

34. Discoloration of heart wood or stained heart must not be confounded with rot or rotten streaks. The presence of rot is indicated by a decided softness of the wood where it is discolored or by small white spots resembling pin worm holes.

PITCH.

35. Pitch pockets are openings between the grain of the wood containing more or less pitch and surrounded by sound grain wood. In determining the seriousness of the pitch pocket as a defect, both its width and length must be considered; the tighter the pocket the longer it may be. Size and number of pockets admissible in any piece must be left largely to the judgment of the grader and a reasonable deviation from the number of pockets specified in the rules will be permissible.

36. Pitch shakes are clearly defined openings between the grain of the wood, are either filled with granulated pitch or not, but in either case are a serious defect and must not be admitted in any grade.

37. Pitch streak is a well defined accumulation of pitch at one point in the piece and when not sufficient to develop a well defined streak, or where fiber between grains is not saturated with pitch, it shall not be considered a defect.

38. A small pitch pocket is not more than $\frac{1}{8}$ in. in open width and not over 3 in. long.

39. A medium pitch pocket is one not over $\frac{1}{8}$ in. in open width and not over 8 in. long.

40. A large pitch pocket is one more than $\frac{1}{8}$ in. in open width and not over 8 in. long.

41. A scab pitch pocket is one in a flat grain piece not more than $\frac{1}{8}$ in. deep, $\frac{3}{4}$ in. wide and 3 in. long.

GRAIN.

42. Chipped grain consists in part of the surface being chipped or broken out in small particles below the line of the cut and as usually found should not be classed as torn grain and shall be considered a defect only when it unfit the piece for the use intended.

43. Torn grain consists in a part of the wood being torn out in dressing. It occurs around knots and curly places and is of four distinct characters: slight, medium, heavy and deep.

44. Slight torn grain should not exceed $\frac{1}{32}$ in. in depth.

45. Medium torn grain not more than $\frac{1}{16}$ in.

46. Heavy torn grain not more than $\frac{1}{8}$ in.

47. Deep torn grain, any torn grain more than $\frac{1}{8}$ in.

48. Wane is bark or lack of wood on the edges of lumber, from any cause.

DETAILED RULES FOR GRADING CAR MATERIAL.

49. No. 2 clear and better V. G. 1 x 4 and 6 in. (car siding, lining, etc.)—Angle of grain no less than 30 deg. Will admit any three of the following defects or their equivalent of combined defects on the face side, based on 10 ft. lengths: Slight torn grain, small pitch pockets that do not extend through the piece, sound pin knots. If specified S2S, rough spots on the back side are permissible if the piece is of uniform thickness.

50. No. 2 clear and better F. G. 1 x 4 and 6 in. (car siding, lining, longitudinal roofing, etc.)—Will admit any three of the following defects or their equivalent of combined defects on the face side, based on 10-ft. lengths: slight torn grain, small pitch pockets that do not extend through the piece, scab pitch pockets, sound pin knots, sound small knots or their equivalent of combined defects. If specified S2S, rough spots on back side permissible if the piece is of uniform thickness.

51. No. 2 clear and better, mill run as to grain.—Apply the same rules as on flat grain and vertical grain.

52. Latitudinal roofing, 1 x 4 and 6 in.—Same as No. 2 clear and better V. G. and F. G., except will allow two defects for each 5 or 6 ft. in length.

53. No. 3 clear 1 x 4 and 6 in. (box car lining, etc.)—May be either flat or vertical grain. Red, yellow, or silver fir. Must be tight-knotted stock. Will admit of torn grain and many contain five pin or three small knots or one standard knot, or five small or two medium pitch pockets, which may extend through the piece, in any continuous five feet of the length of the piece, or their equivalent of combined defects.

54. No. 2 clear and better V. G. 1 $\frac{1}{2}$ and 2 x 6 and 8 in. (car decking, etc.)—Will admit any three of the following or their equivalent of combined defects on the face side: medium torn grain, medium pitch pockets that do not extend through the piece, sound small knots in a 9 or 10-ft. piece. Rough spots on the back side permissible if the piece is of uniform thickness. On D&M and shiplapped stock a $\frac{7}{16}$ in. or $\frac{1}{2}$ -in. tongue or lap may be $\frac{1}{8}$ in. scant in width on occasional pieces.

55. No. 2 clear and better F. G. 1 $\frac{1}{2}$ and 2 x 6 and 8 in. (car decking, etc.)—To be graded the same as V. G. except that scab pitch pockets will be admitted.

56. Select common decking—Will admit heavy torn grain, heart stain, any number of sound standard knots, or medium pitch pockets that do not extend through the piece, or any combination of the above with minor defects. On D&M and shiplapped stock a $\frac{7}{16}$ -in. or $\frac{1}{2}$ -in. tongue or lap may be $\frac{1}{8}$ in. scant in width on occasional pieces.

57. No. 1 common decking—Will admit heavy torn grain, any number of tight large knots, or medium pitch pockets that do not go through the piece, or minor defects. On D&M and shiplapped stock a $\frac{7}{16}$ -in. or $\frac{1}{2}$ -in. tongue may be $\frac{1}{8}$ in. scant in width on occasional pieces.

58. Select common (car sills, framing, etc.)—Will admit of heavy torn grain, any number of tight knots not more than one-fourth the width of the piece in diameter, if not in clusters, medium pitch pockets, heart stain or minor defects.

59. No. 1 common (car sills, framing, etc.)—Will admit heavy torn grain, any number of tight knots, not more than one-third the width of the piece in diameter, any number of pitch pockets, heart stain, slight wane, or minor defects.

ELECTRIFICATION OF RAILWAY THROUGH THE APPENINES.—The Minister of Public Works of Italy has approved the proposed electrification of the railway between Sampierdarena, Genoa, and Ronco, in Liguria, Italy, on the Genoa-Milan and Genoa-Turin line of the Italian State Railway. The undertaking of electrifying this road will necessitate an expenditure of about \$1,200,000. Plans of work projected in connection therewith have been officially approved. As this railway is already partly electrified—that is, from Pontedecimo to Busalla—over the Giovi Pass, the new undertaking will be to connect Sampierdarena and Pontedecimo by electric railway, and to likewise connect Busalla and Ronco. This will electrify the larger part of the railroad from Genoa through the Appenine mountains. It is expected that the line will be in operation electrically by March, 1914. Unlike the present system of electric railway now in operation over part of this road, for the new project electrical power will be provided by a private company, arrangements already having been made with the Società Forze Idrauliche della Maira. The total distance of the electric railway from Sampierdarena to Ronco, including that already in operation, will be about 16 $\frac{1}{2}$ miles, the two parts to be built being about 10 miles long and that in operation being about 6 $\frac{1}{2}$ miles long. Electric locomotives on the railroad through the Appenines were made by the Società Italiana Westinghouse, of Vado, Liguria. There are at present 50 electric locomotives on the Italian State Railways, more than 25 of these locomotives are being used on the Giovi. Five new electric locomotives were ordered for the Italian State Railways last year from the Tecnomasio Italiano Brown-Boveri, of Milan, manufacturers of machines, etc.

ADOPTED DESIGN OF THE QUEBEC BRIDGE.*

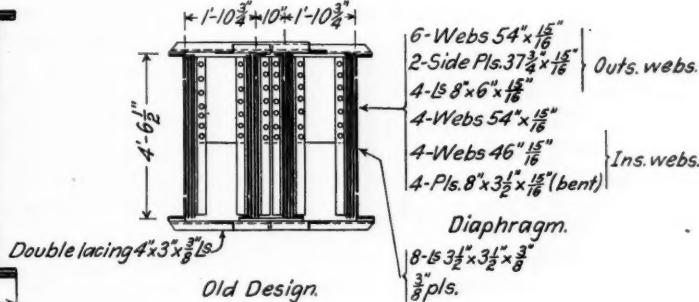
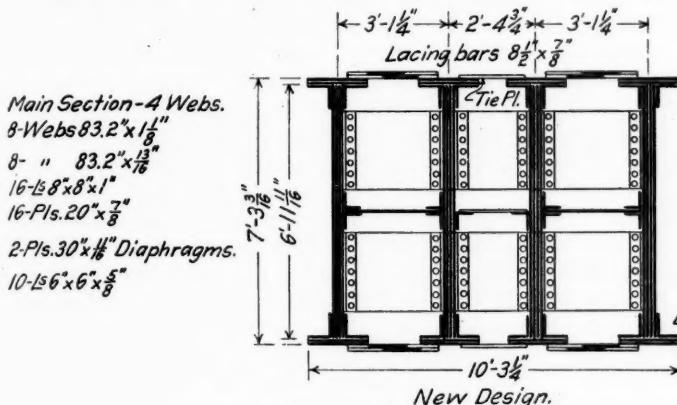
Discussion of Elements Considered in Designing the Longest Span in the World by Member of the Board of Engineers.

BY RALPH MODJESKI,
Consulting Engineer.

The clear height of the Quebec bridge above high water was fixed by the navigation interests at 150 ft., and the length of span 1,800 ft., is entirely due to the physical conditions of the crossing. The stream at this point is narrow and deep, the depth in the center being about 190 ft. The current velocity at ebb tide is very high—about nine miles per hour. Very heavy ice runs at times and tends to gorge. The bed rock, as shown

expensive structure will afford sufficient advertisement and publicity to compensate for the additional expenditure.

A project to build a large bridge at Quebec, presumably in the same location as the present one, was seriously considered in 1884 and 1885. Messrs. James Brownlee, A. Luders Light and T. Claxton Fidler designed a structure with a clear span of 1,442 ft. The description of that project mentions rock

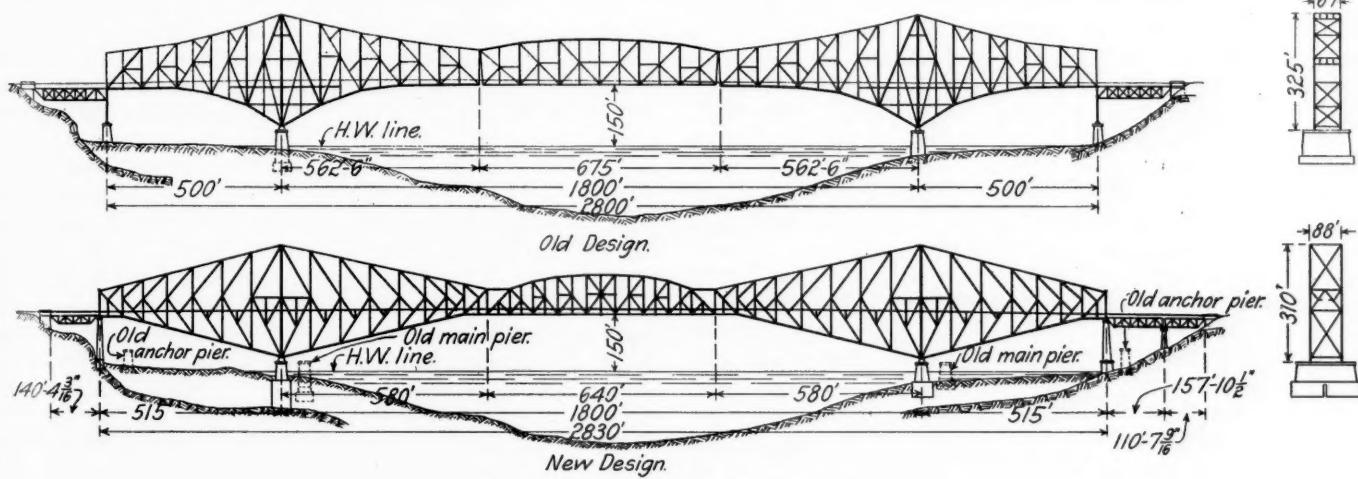


Lower Chords of Old and New Quebec Bridge Designs.

by the borings, while accessible near the shore lines, dips rapidly towards the center of the stream. All these conditions made it imperative to build a span of great length. The information as to bed rock which we now have would indicate that the original project could have been designed with a somewhat shorter span, yet we should remember that this original project was undertaken by a private corporation, and we should perhaps recognize the value to it of such advertisement as the building of

foundations. The more complete information we now have, which was obtained by a costly series of borings, shows that at the present location rock could not have been attained in both piers with any known method of foundation if the piers had been spaced only 1,442 ft. apart, even if the great depth of water could have been overcome.

After the disaster of August 29, 1907, the Dominion government took up the reconstruction of this bridge. A board of



Old and New Quebec Bridge Designs.

the longest span in the world would obviously afford. The next longest span is that of the Firth of Forth bridge, 1,700 ft. It is doubtful if a shorter span than 1,700 ft. would have been practicable at the location adopted for the Quebec bridge. I consider it perfectly legitimate to build a more expensive structure than economy of the work itself would call for, if the more

three engineers, including myself, was appointed to design and construct the bridge. After some study of the situation, the board decided that the new bridge should be made wider between trusses and designed to carry heavier loads than those originally contemplated; that, further, none of the old steel work could be used to advantage. It also decided to keep the same location. The final outcome is a double-truck span of 1,800 ft., with a width of 88 ft. between centers of trusses. The old piers were not large enough for the

*Abstracted from a paper presented at the meeting of the Mechanical and Engineering Section of the Franklin Institute. Copyrighted by the Franklin Institute.

new design and could not, therefore, be used. The two main piers will be designated as north pier and south pier respectively. At first the board contemplated building an entirely new pier 57 ft. south of the present north pier and enlarging the foundation of the south pier by sinking additional caissons adjacent to the old caisson. The necessary span length would then have been 1,758 ft., and it was on that length of span that tenders were asked. It developed later, from the experience of sinking the north caisson, that the method proposed for enlarging the south foundation would not be safe, even if it were practicable, and so an entirely new foundation and pier were decided on for the south shore. The new north pier could not be placed farther out in the river because of the sloping bed rock and great depth of water. The south pier could not be placed on the north, or river, side of the old south pier, because of the old wreckage, so it was placed 64 ft. 8 in. south of the old pier, or as close as possible to it. Both new piers being placed 64 ft. 8 in. south of the old piers, measured between centers, the new span remains 1,800 ft. long.

With this span length and with the materials now at the disposal of the engineer, the practical limit of cantilever construction has very nearly been reached. In fact, if economy alone is to be considered, a cable suspension bridge would have been cheaper for a span of 1,800 ft. The cantilever structure presents a greater rigidity under moving load, and this greater rigidity was the determining factor in the decision of the board to adhere to the cantilever type. Tentative plans of the suspension type with wire cables were, however, partly worked out by the board in the way of study. The comparative rigidity of the cantilever system and the suspension type may be gaged by the deflections at the center of the span under full load.

New Quebec span, total live load..... 11 $\frac{3}{4}$ in.
A cable suspension bridge, trial design—live load only, over..... 2 ft.
A cable suspension bridge—with 120 deg. variation in temperature and full live load—between highest and lowest position about..... 7 ft.

The new bridge was finally designed with two anchor arms 515 ft. long, a suspended span 640 ft. long, and two cantilever arms 580 ft. long. The moving loads adopted are two Cooper's Class E-60 engines on each track followed or preceded, or followed and preceded, by a train load of 5,000 lbs. per foot per track. In addition to the actual dead load of the structure, a load of 500 lbs. per lineal foot on the suspended span and 800 lbs. on the balance of the bridge was allowed for snow. The wind loads were taken as follows: A wind load normal to the bridge of 30 lbs. per sq. ft. of the exposed surface of two trusses and 1 $\frac{1}{2}$ times the elevation of the floor (fixed load), also 30 lbs. per sq. ft. on travelers and falsework during erection; a wind load on the exposed surface of the train of 300 lbs. per lineal foot applied 9 ft. above the base of rail (moving load); a wind load parallel with the bridge of 30 lbs. per sq. ft. acting on one-half the area assumed for normal wind pressure. The assumed wind pressure is equivalent to about 35 per cent. of the uniform live load near the piers and to about 20 per cent. of the live load near the ends of the cantilever arms.

A pressure of 30 lbs., according to German experiments with electric cars, would correspond to a wind of a velocity of over 100 miles per hour. Other experiments made at various times on small surfaces show that a velocity of 85 miles would correspond to a pressure of about 30 lbs.

With a wind of this velocity there would be no traffic on the bridge—empty freight cars or even light passenger cars would be overturned. Velocities of over 85 miles may occur in cyclones and tornadoes over restricted areas. Such storms are very rare in Canada; but even should such an extraordinary disturbance happen, causing a wind pressure of as much as 60 lbs. to be applied to the entire bridge the stresses in the truss members would be less than with the maximum live load and a 30 lb. wind, and although the stresses in the laterals would be increased above the specification limits, they would still remain within the elastic limit of the members.

Where there are no other considerations beyond the actual working stresses in the finished structure, the most economical length of the suspended span for a total span of 1,800 ft. would be in the neighborhood of 1,000 ft. But to erect a simple span of such unprecedented length, either by floating or by the cantilever method, would be impractical. Furthermore, the cantilever method of erecting a suspended span of even a moderate length always requires additional material, both in the cantilever arms and in the suspended span, to take care of the erection stresses. The longer the suspended span in relation to the total main span, the greater will be the required addition—so that whether it be contemplated to erect the suspended span by the cantilever method or by floating into position, the length of the suspended span finds itself limited not by mere economic considerations of the finished bridge, but by either the excess of material required during erection by the cantilever method, and difficulties arising therefrom, or by the difficulties attending the floating of a very long and heavy span into position. These difficulties increase very rapidly with the length of the span to be floated. In the new design the suspended span is the longest which the board considered safe to float, and it fits the entire design very well. The erection of this span by floating made it possible to design it with the view to greatest economy. Its various members will not be subjected to any greater stresses during erection than they would be in a simple span of the same length resting on two piers. It was, therefore, possible to design it as economically as to weight as a well designed simple span would be. It is more important to save weight in a suspended span than in an independent simple span, because each pound in the former requires several pounds in the entire structure to carry it. One pound uniformly distributed over the trusses of the suspended span needs 3 lbs. of metal added to the bridge to carry it, making an addition of 4 lbs. in all. This accounts for curved top chords in the span in question, as well as for the use of nickel steel for the trusses.

It has been pointed out that the length of the anchor arms is uneconomical—that a shorter arm would have been cheaper. It must not be forgotten that a shorter anchor arm increases the pier reactions, as well as the steel in the anchorage proper. The present anchor piers are founded on rock ledges which dip rapidly toward the river. To move them nearer to the river would have involved much more expensive foundations.

It may be remarked here that, while an addition of dead load in the main span will require several times the weight of metal to carry it, an addition of dead load in the anchor arm requires no increase of metal to carry it when there is an upward or negative reaction on the anchor pier. This is explained by the fact that any load placed between the main piers or on the main spans increases all moments and shears over all the spans, while any load placed on the anchor arm, if the reaction on the anchor pier is negative, decreases that reaction and consequently the moments in the anchor arm, but has no effect whatever on the main span. For this reason carbon steel will be used mostly in the anchor arms of the new design. The carbon steel unit stresses adopted are generally 5/7 of the nickel steel stresses, the former requiring heavier members. This additional weight in the anchor arms is a source of economy when the relative prices of carbon and nickel steel are considered.

An opinion has been expressed that the height over the piers is not great enough for economy. Actual calculations show that for economy the height of 310 ft. is too great by about 20 ft. for the "K" system of trussing adopted; further, that this height would have been at least 40 ft. too great for the original system of the official design. The height of the Forth bridge towers, while 26 ft. greater than the Quebec bridge, though the span is 100 ft. shorter, is no doubt economical for the form of trussing adopted. The economical height is not only a function of the length of the span, but also of the panel length next to the pier. This height should be such as to correspond to an in-

clination of the diagonals not far from 45 deg. A double intersection system with very long panels near the pier, such as adopted in the Forth bridge would have been economical for the Quebec bridge, except that it requires a system of secondary members or sub-posts, or very heavy longitudinal girders, or both, to carry the load from panel to panel. Then, too, it is well to reduce in the members the stresses due to their own weight—which in long panels become quite important. The 20-ft. excess in height of the present Quebec design over what would have been the economical height is justified by the resulting reduction in the sections of the bottom chords, which are of considerable size at best.

In long cantilever spans the bottom chords of the cantilever and anchor arms should be straight when possible. With a curved chord the joints must be made at the panel points. These joints are of great importance, as has been shown in the report of the Royal Commission on the Quebec bridge disaster. They should be fully spliced to take care of secondary stresses due to deflections of the span during erection and under the action of live load. It is advisable, therefore, to place them outside of the point of connection with the diagonals and keep them clear of gusset plates. The same objection does not exist in top chords of simple spans, which are of moderate sizes, even in the longest spans known. The economy in simple spans resulting from such curved chords is worth while and quite important, while if any economy were to result from curving the bottom chord of the cantilever and anchor spans, such economy would certainly be of little importance in comparison with the resulting disadvantages. The vertical deflections from live loads are not as great in a straight chord design as in a curved chord design. Another consideration in favor of the straight chords is that the most important, in fact the bulk, of the wind forces travel to the pier through the bottom chords of the cantilever and anchor arms and the wind bracing or lateral system situated in their plane. The straight bottom chords carry these stresses directly to the piers without transmitting any appreciable components to the web system of the trusses. Not so with curved bottom chords. At each joint where the chord's direction is changed a component stress is transmitted to the web. This means that while a pair of straight chords with its lateral system deflects under the action of the wind in the plane of the chords only, a pair of curved chords, by transmitting shear to the web members, causes the trusses to deflect, the windward truss downward, tending to flatten the curve, and the leeward truss upward, tending to make the curve more pronounced. The rigidity of the straight chord design against lateral deflections and oscillations is therefore greater than that of the curved chord design.

One of the reasons why curved bottom chords were used in the cantilever arms of the original Quebec bridge design was the fact that it was the aim of that design to provide full headroom of 150 ft. on a width of 1,000 ft. The bottom chords of the anchor arms were then made curved also for the sake of symmetry. This width on which the full headroom will be obtained has been reduced in the new design to about 760 ft., which certainly is more than ample to accommodate navigation. Only the highest vessels will be limited to this width of 760 ft., and that only at high water.

The top chord of the Quebec bridge cantilever and anchor arms is straight. The Forth bridge cantilever arms have straight top chords also. While there was good reason for making the Forth bridge top chord straight, there was no serious reason, beyond a slight increase in vertical rigidity, for making it straight at Quebec. The two trusses on the Forth bridge are in planes inclined toward each other at the top. The two top chords are parallel. Had they been made curved they could not have been parallel, since they must necessarily be situated in the inclined planes of the trusses. The appearance of tension chords having a greater distance apart at the center of the arm than at either end would have been very bad. But there is no such reason at

Quebec. The trusses are in vertical planes and the top chords could have been curved without serious inconvenience, but also without any advantage. The board considered that, aside from the additional vertical stiffness, a straight chord will present an appearance of strength which a curved chord would not.

With regard to the distance between trusses and their position relative to each other, the trusses of the new Quebec bridge will be in two vertical and parallel planes. The distance, center to center of trusses will be 88 ft. One of the first preliminary sketches made after the board was created contemplated placing the trusses in planes inclined in the same manner as in the Forth bridge, namely, with the tower posts converging toward the top and the bottom chords of both the anchor and the cantilever arms converging toward their respective ends. Another sketch contemplated trusses in vertical planes, but converging for the anchor and cantilever arms toward their respective ends. Both these plans would be economical in the amount of metal required in the finished bridge; but erection of a structure of this magnitude is extremely difficult, and some sacrifice of economy is necessary to make the field work as safe and easy as possible. It was during the erection that the old Quebec bridge collapsed. The board consulted several of the best authorities on erection of large structures, and, while their opinion differed somewhat, it was decided, after much deliberation, to make the trusses parallel throughout. In doing so we had in mind not only the erection which was the principal consideration, but the greater simplicity of details at such important points as the pier posts and the points of suspension of the suspended span. The connections at these points become quite complicated when the anchor arm, cantilever arm, and suspended span trusses are not all in the same plane. It would have been possible to design the bridge with trusses in two planes inclined toward each other, parallel to the axis of the bridge and passing through the end supports of each truss. In this manner all connections of truss members would have been nearly as simple as in the adopted design. Such a design was also suggested and considered. But it was soon decided that the erection of heavy members in an inclined plane of the truss would be too hazardous, and this plan was abandoned. It may fairly be asked, since the Forth bridge, with its curved bottom chords, inclined and flaring trusses, has been so successfully constructed, why was it not possible to follow a similar design in the Quebec bridge? The difference is all in the labor conditions prevailing on the two continents at the respective times of building these bridges. At the Forth bridge 3,200 to 4,100 men were employed when the work was proceeding full swing; their number attained 4,600 for a short period. At Quebec such a large force could not be mustered. The contractors contemplate now using approximately 400 men in the field and not over 1,000, including men in the shops. In the Forth bridge the material was all manufactured at the bridge site. By using a large force of men it was possible to build up the various members of single plates or shapes so that no heavy pieces were handled. The admirable design, consisting principally of tubes, of which there are nearly six miles in the bridge, was built up in a similar manner as boilers are made—piece by piece. The various connections were laid out in the field, plates bent to suit, drilled and riveted on. This method of procedure would be impossible in Quebec. Not only are the men not available, but while on the Firth of Forth the climate is such that work may go on at all seasons of the year, in Quebec work aloft is impossible during more than seven months in the year. Here, then, the bulk of the work must be done by machinery to save manual labor, and must be done in the shops to permit a continuous progress. The work in the field must be reduced to the minimum or to the assembling of large pieces—as large as it is practicable to handle. The American type of pin-connected construction lends itself best to these conditions, but with that type the details will be much simpler and the erection much easier with trusses situated in two vertical and parallel planes.

The system of trussing was from the beginning the object of

discussion and diversity of opinion among the members of the board. The design submitted by the St. Lawrence Bridge Company, with what may be called a "K" system of trussing in the cantilever arms and anchor arms, was finally recommended by the majority of the board and later endorsed by an enlarged board appointed by the Minister of Railways and Canals for the special purpose of selecting the best tender. The main reasons for recommending the design in question are given in the enlarged board's report as follows: (a) The type of design offers greater safety to life and property during erection, as well as economy and rapidity in construction. (b) The design contains the minimum number of secondary members and requires few, if any, temporary members during erection. (c) The system of triangulation, by dividing the web stresses, reduces the members to more practical sections and simplifies the details of connections. (d) The design economizes material, as shown by the calculated weights of the two designs. (e) The general appearance of the structure is, in our opinion, improved. There are two advantages of this "K" design which are not clearly brought out in the above reasons, and on which I wish to lay considerable stress, namely, uniform deflections and regularity of erection operations from panel to panel. Secondary members, or those which receive their maximum stress from partial live load only, such as the vertical suspenders carrying one panel of floor, or members which carry dead load only, such as vertical sub-posts supporting the top chord, or members which normally have no stress in them, such as struts which serve to reduce the unsupported length of main compression members, are the source of local bending in the main members to which they connect. Of the designs submitted, the one adopted has the least number of secondary members. It should be remarked that the same advantage could have been obtained with a double intersection Warren truss by arranging the panel lengths in such a manner as to eliminate the intermediate vertical secondary members supporting the chords.

The regularity of erection operations consists in the fact that, starting from the pier, the position of members in each panel in the "K" design is just like the preceding one, and that coupling up of members in each successive panel, as the traveler moves forward, requires the same succession of motions as in the preceding one, except that pieces become lighter as the erection proceeds. Experience shows that the oftener an erection crew goes through a series of the same motions, as, for instance, in erecting a succession of simple spans all alike, the more rapid their progress becomes.

The lateral wind-bracing has been omitted between the top chords of the cantilever and anchor arms. All wind forces are taken directly to the pier through substantial bracing between the bottom chords. This arrangement not only makes the distribution of wind stresses perfectly definite but permits the spreading of tracks to 32 ft. 6 in., center to center, instead of the usual 13 or 14 ft., which results in a saving in the floor system, and consequently in the entire structure. With the tracks spread, a load on one track only produces a torsion in the cantilevers, and the presence of wind-bracing between the top chords would produce undesirable and excessive stresses which would have to be taken care of by a large addition of metal to the lateral and sway systems and to the trusses.

The floor system is of carbon steel throughout. It is, therefore, stiffer than if made of nickel steel. The long floor beams deflect less and the secondary stresses produced by their deflection are thus reduced. Even then some of the connections of floor beams to posts had to be made by means of pins. The top chords of the cantilever arm and of the anchor arm as now designed are of carbon steel eyebars. The originally submitted design contemplated nickel steel plates riveted throughout for the cantilevers, and carbon steel plates for the anchor arms. By substituting eyebars a better design is obtained and much easier erection assured, and, although nickel steel is replaced by carbon steel in the cantilever arm, the substitution results in a sav-

ing when both the cantilever and anchor arms are considered. Carbon steel will be used in the entire anchor arm, in the top chord and pier members of the cantilever span in the top lateral system of the suspended span, in all the floor system and all sway bracing. Nickel steel will be used in the trusses and bottom laterals of the suspended span, in the trusses except top chords and pier members, and in the lateral system of the cantilever arms. The anchor bars which hold down the ends of the anchor arms have been made very long to reduce bending stresses from expansion.

The suspender eyebars which support the suspended span are subject to oscillation in the plane of the trusses, due to expansion. A total expansion of 16 in. must be taken care of at these two points of suspension—besides the extension of the bottom chords under the live load. Manganese bronze bushings will be provided in these eyebars to permit of easy turning on the pins. But, even should these fail to turn, there is sufficient metal in these eyebars to prevent overstress from bending.

Friction brakes will be installed to prevent excessive longitudinal oscillations of the suspended span under tractive forces of trains.

All latticing of compression members is designed in proportion to the sectional material of each member. The latticing is made strong enough to transmit in transverse shear 2 per cent. of the direct stress of the member.

The bottom chords of the anchor and cantilever arms and their details were the subject of a great deal of study and of many tests. Little is known about bridge compression members when compared to tension eyebars. The Quebec compression chords are members of unusual size. It is only in work of great magnitude that the engineer has an opportunity to make tests on a large scale; the expense of such tests is trifling in comparison with the importance to the structure of the results obtained. It is not sufficient to know that in some bridges a compression member is still standing and is subjected to a certain stress. What we should know is how much greater stress it would take to destroy that member. Such a member may be in the stage of danger from the last straw. The board made a number of tests on models of chords and posts, both for the official design and for the final one. The tests gave generally better results for model members representing the latter. The board feels, therefore, that a good design for these heavy members has been obtained.

There never was any serious doubt among the members of the board as to the advisability of making the bottom chords of the anchor and cantilever arms riveted throughout without pin joints, except at the main pier bearings, to avoid excessive secondary stresses. This was done and will result in a stiffer bridge.

The original design as submitted by the St. Lawrence Bridge Company contemplated top chords built of plates entirely. While this was approved at the time, later studies proved that by building the top chords of carbon steel eyebars there will be a slight saving of weight and cost, and the change was authorized. A tension member built of eyebars is the most reliable type by reason of the large number of full-size eyebar tests which have been and are constantly being made. It is the logical form of construction for transmission of tensile stresses. Their use reduces the secondary stresses. In a chord built up of wide plates with riveted joints, making it continuous, the secondary stresses resulting from bending due to the deflection of the span would be considerable, but owing to the uniform deflection of the "K" design they could easily be taken care of.

Secondary Stresses.—I shall not dwell long on this latest addition to bridge calculations. That secondary stresses exist is a fact. They may be from three sources: *First*.—Weight of member. *Second*.—Temperature. *Third*.—Bending from loads.

In the new Quebec design all secondary stresses were calculated and taken care of, but as a result of tests made by the board, the stresses in tension members due to their own weight will be neglected. It is quite possible that if similar tests could

be made for other secondary stresses it would be found that the metal adjusts itself to a large extent in such a manner as to reduce the importance of those secondary stresses and their influence on the elastic limit of the member. Personally, I feel there is a tendency at present to overrate the importance of secondary stresses. They should, of course, be considered in designing a structure; it should be the aim of the designer to reduce these secondary stresses to the minimum, but excessive refinement should be avoided, and unit stresses for direct loads should be made low enough to include these secondary stresses where they may exist.

FUEL ECONOMY BY THE ENGINE CREW.

By M. E. WELLS,

Assistant Master Mechanic, Wheeling & Lake Erie, Brewster, Ohio.

During the fall and winter our traveling engineers were furnished with counters so that they could check the number of shovels of coal used by any fireman on any part of the road. Different firemen were checked over the same piece of road and compared. This showed very favorably in some cases; as for example, the three firemen on No. 3. These men all did good work and the amount of coal they used checked to within a few shovels; but cases were found where some men used very much more than others on the same

and the fireman used 327 shovels of coal, while the other engineer made the run in 10 minutes less time and the fireman used but 300 shovels of coal. This was a saving of almost $\frac{1}{4}$ ton of coal or about 9 per cent., in other words, 9 shovels of coal were saved in every hundred. If only two shovels of coal in every hundred were saved we could reduce the coal bill on our railroad \$10,000 in one year, and in the United States this would amount to a saving of four million dollars per year.

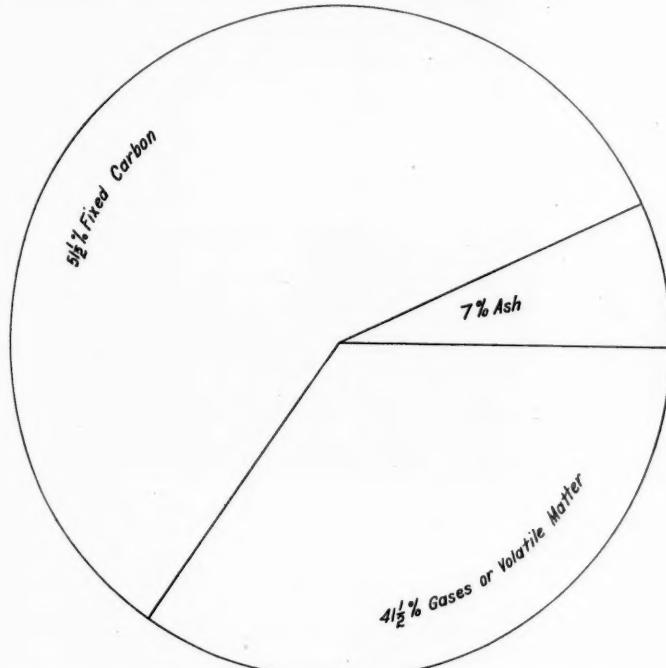
HEAVY SLUG FIRING VERSUS LIGHT CAREFUL FIRING.

Slug firing is the most common of all wasteful practices, and is the hardest to correct. The following trips from Kent to Canton were compared and were otherwise the same except that fireman No. 1 had 98 tons more in his train. No. 1 used 8 shovels of coal to a fire, whereas fireman No. 2 had a lighter train and used from 10 to 20 shovels of coal to a fire. Fireman No. 2 used 254 shovels of coal, while fireman No. 1 used 228 shovels of coal, or about 10 per cent. less than No. 2. We have another comparison where the same fireman made practically similar trips between Adena, Ohio, and Rexford. On the first trip he was allowed to fire according to his regular methods. On the second trip he was coached in lighter and more careful firing with the following result: On trip No. 1 he used 220 shovels of coal, and on Trip No. 2 he used 179 shovels of coal, making a saving of 41 shovels of coal; or about 19 per cent. less than on his first trip.

OVERLOADING TANKS AT COAL TIPPLES.

The coal is handled very carefully at Brewster. The hostlers that spill the coal are required to pick it up at once, and it is done. On account of this they spill very little, and do not overload the tanks. This crusade has been carried to the tipples at other points, with good results, but it must be constantly watched and followed up.

If the enginemen and firemen on our road could only know of the poor fuel that is used in some other parts of the United States in locomotives, they would certainly feel that they were very fortunate. On many roads the coal contains so much ash and clinkers that the fireman's work is greatly increased and, in many instances, double what it is with us. The firemen should use every care to have all the available heat units in the coal consumed. The percentage of heat producing material in the average coal on the Wheeling & Lake Erie is shown in the accompanying diagram. It will be seen that 93 per cent. of the coal is available for heat, but not all of it is utilized. There is no more important matter regarding fuel economy than getting locomotive firemen to realize that practically one-half of the heat producing material in our coal is in the form of gas, and that just as soon as the coal strikes the fire these gases are driven off. If this process is not carried on slowly a large percentage of this available heat producing material goes off in gas and is wasted. A locomotive firebox can be made either a furnace for producing heat, or we can make of it, if we wish, a gas retort. If the fire is kept thin and hot so the air can get through it and the fuel is placed in the firebox in small quantities and at reasonable intervals, the gas, as I have described, will be driven off in small quantities and most of it will be burned in the firebox and produce heat as it should. After the gases are driven off there is left on the grates what is known as the fixed carbon of coal (coke) which burns without flame, in an incandescent manner. If, however, heavy charge firing is practiced and 10, 15 or 20 shovels of coal are put in at one time a gas retort is, in fact, made of the firebox. In the first place the fire is very materially cooled by the heavy charge; also much heat is consumed in driving off the gases, the result being that large quantities of gases are driven off at a temperature too low to burn with the oxygen present. In this way a large amount of the available heat producing properties of the coal pass out of the



Analysis of Average Ohio Coal Used on the Wheeling & Lake Erie.

run. Some interesting comparisons obtained by means of the counters are given below.

ECONOMICAL CUT-OFF.

Under this heading there are two classes of engineers. While the ranks of one of these classes are getting thin, there are a few left. There are engineers who honestly believe in a long cut-off and a light throttle; while the other class, who may truly be called Progressives, believe in a short cut-off and an open throttle, thereby getting greater expansive force out of the steam. An interesting comparison between these two classes of men was shown on train No. 193, between Canton, Ohio, and Kent. There were 1,950 tons in each train and they had the same fireman. There were six days between the two trips and each made two stops. The engineer using the long cut-off made the run in two hours

stack and are lost. Volatile gases burn with a flame and when there is a flame it is assured that the gases are burning. Fixed carbon in the form of coke burns without flame.

If I have made it plain that it is possible to save one, two, three, or even ten shovels of coal out of every hundred now being used, why should it not be done? Why should it not, at least, be tried?

NEW WESTERN PACIFIC SHOPS AT SACRAMENTO, CAL.

The Western Pacific has had under construction for the past two and one-half years a complete new shop installation at Sacramento, Cal., which was opened for operation July 12 of this year. Eight buildings have been completed and two more are contemplated in the near future.

The office building is 45 ft. wide x 100 ft. long, 2 stories high and is constructed of reinforced concrete. The first and second floors will be occupied as offices while small supplies will be stored in the basement. An annex consisting of a covered platform 45 ft. wide x 50 ft. long and an open platform 55 ft. wide x 150 ft. long will be used for the storage of larger supplies required for repairs to equipment.

A machine and erecting shop 140 ft. wide x 227 ft. long with

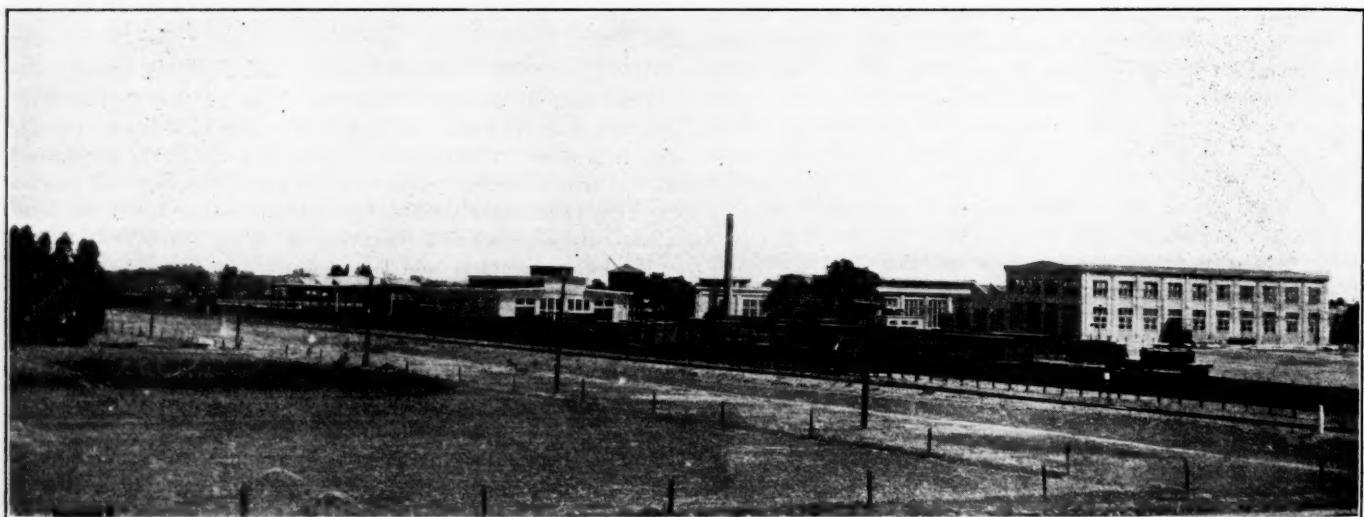
which will supply all parts of the yard by gravity. The design and construction of these buildings and tracks has all been handled by forces of the railway company.

AMERICAN RAILWAY SAFETY ASSOCIATION.

A convention of the American Railway Safety Association, which was organized at Chicago on June 9, was held at the La Salle Hotel, Chicago, on September 22. A. W. Smallen, chairman of the general safety committee of the Chicago, Milwaukee & St. Paul, and temporary president of the association, presided, and twenty-four roads were represented by one or more officers in attendance. The meeting was largely devoted to informal discussions of the various problems encountered by the members in the "safety first" work and to the exchange of ideas and experiences with various methods.

It had been expected to complete the permanent organization of the association at this meeting by the election of permanent officers, but the election was postponed until the next meeting, to be held at the call of the executive committee.

A resolution was adopted endorsing the movement inaugurated by the National Council for Industrial Safety, and a committee was appointed, consisting of M. A. Dow, of the New York Cen-



View of New Western Pacific Shop Buildings at Sacramento, Cal.

two additions, one 20 ft. x 66 ft. and the other 20 ft. x 110 ft., are of steel frame construction with reinforced concrete walls. The building will accommodate 10 engines at one time and is equipped with a 120-ton traveling crane 74 ft. 6 in. long and a 125-ton electric transfer table. Provision has been made for a future extension to this shop of 233 ft. A boiler shop 100 ft. x 140 ft. will be erected opposite the machine shop and will be served by the same transfer table.

A blacksmith shop 80 ft. wide by 138 ft. long, of steel and concrete construction was built north of the machine shop with provision for a future extension of 142 ft. A coach shop 116 ft. by 162 ft., of steel and concrete construction has been erected north of the blacksmith shop, this building being served by 7 tracks. A paint shop of the same dimensions as the coach shop is to be built soon. A power house, 42 ft. x 70 ft., of reinforced concrete construction, with a concrete stack, has been erected directly west of the blacksmith shop. Other buildings include a reinforced concrete electric transformer house, a planing mill, 80 ft. x 140 ft., of timber construction with sheet steel exterior covering and a freight car repair shed, 80 ft. x 160 ft., with open sides and ends and a saw-tooth roof. The shops are equipped with complete water, sewage and fire protection systems, water being pumped from a deep well into a large tank

tral Lines; W. C. Wilson, of the Delaware, Lackawanna & Western; J. N. Guild, of the Union Pacific, and R. C. Richards, of the Chicago & North Western, to attend the meeting of that body at New York during the week, and to report at the next meeting whether or not the Safety Association should join the council and whether it should be recommended that the roads join as individuals.

A communication was read from the Railway Special Agents' Association reporting the result of an interview with Presiding Judge Harry Olson, of the Chicago municipal court, regarding the difficulty in obtaining punishment for trespassers arrested on railway tracks. Judge Olson had issued instructions to the judges that trespassers be fined, but it was learned that the Chicago ordinances against trespassing only applied to elevated tracks. R. C. Richards said he had written letters to the municipal judges, citing statistics as to the evils of trespassing, and A. W. Smallen said he had addressed the judges on the subject at the invitation of Judge Olson. Recently the judges with one exception, have made it a practice to fine or severely reprimand trespassers brought before them. E. M. Switzer, superintendent of safety of the Chicago, Burlington & Quincy, suggested that much good might be accomplished by enlisting the interest of the Boy Scouts organization in the anti-trespassing campaign, and

W. C. Wilson (D. L. & W.) was appointed to confer with the officers of that body.

On motion of C. T. Banks, special representative of the first vice-president of the Northern Pacific, it was decided that each member of the association should furnish all other members with copies of all literature, circulars, etc., used in the safety campaign in order to promote a free interchange of ideas.

There was a long discussion on the question of the advisability of adopting a uniform basis for reporting personal injury accidents. It appeared that the reports of different roads cannot properly be compared at present because of the different bases used. Several speakers were in favor of using the basis required for reports to the Interstate Commerce Commission, which includes as injuries to employees all cases where the men lose three days' time, and as injuries to passengers all cases where passengers claim to be injured. Others preferred to report all cases where one day's time is lost. Several roads have been compiling their reports on that basis for years, and their comparisons would be seriously disturbed by any change. It appeared that in the safety work most of the roads represented keep records of all injuries, no matter how slight, but report in their comparisons only those which cause the loss of one or three days' time, but it was agreed that all roads could readily use the commission basis, as they have the figures compiled for their reports to the commission. A committee was appointed consisting of R. C. Richards, C. & N. W.; C. T. Banks, N. P.; W. C. Wilson, D. L. & W.; C. J. Wymer, C. & W. I., and A. J. Krause, M. K. & T., to report at the next meeting a recommendation as to a uniform basis for reporting accidents.

There was also considerable discussion as to the best ways of using moving pictures in safety work, and of the merits of various propositions made by the film producers to various members.

On the subject of reducing accidents to track men on construction work where a large proportion of the men cannot understand English, and do not remain on the job long enough to be educated, Mr. Banks said that he had accomplished good results by spending a month in the construction camps and working with interpreters to impress upon the men the necessity of greater care. A representative of one large road stated that while among other classes of employees there had been a decrease in accidents there had been an increase among track employees. The road has a large amount of new construction under way and many men in the extra gangs, 17 per cent. of whom change every week, are killed by stepping from behind one train in front of another, or are injured in handling rail.

F. V. Whiting, general claims attorney of the New York Central Lines, said that his company had obtained good results by posting watchmen with megaphones to warn track gangs of approaching trains. E. L. Tinker, safety supervisor of the El Paso & Southwestern, said that a big decrease in accidents to track gangs had followed a series of lantern slide lectures illustrating common causes of accidents in track work.

L. F. Shedd, safety supervisor of the Rock Island Lines, described a campaign to induce shop employees to wear goggles. During a recent period 23 per cent. of the accidents reported on 15 divisions were eye injuries. He had held a large number of noon meetings to talk to the men on the causes of eye injuries, and the company furnished them with goggles. During the fiscal year 1913, the Rock Island had 22 less deaths among employees than in the previous year, and 400 less injuries to track and bridge men.

John Hair (B. & O.) said that his road furnished all shop employees with goggles free, and tried to induce the men not to wear gloves in machine work. It was also stated that the Burlington has furnished all of its shop employees with goggles and has not had a case of a loss of an eye among them for ten months. The Union Pacific has furnished 3,000 pairs of goggles to its employees.

At the close of the meeting those present visited the Safety exhibit car of the New York Central Lines (described in the

Railway Age Gazette of August 8, page 229), which was on exhibition at the La Salle street station. Mr. Dow said that 20,000 people had visited the car during its trip from New York to Chicago.

The objects of the association, as described in the constitution adopted at the last meeting, are:

To advance the interests of the safety movement: (1) By affording members an opportunity of conferring and co-operating with each other, and thereby to facilitate the interchange among members of the best and most successful methods for advancing the work of the Safety movement and for realizing its benefits and possibilities. (2) By instilling the idea of safety in the public mind, and by creating a sentiment which will result in the enactment and enforcement of laws prohibiting trespass on the tracks and trains of steam railways, with its consequent loss of life and injuries to persons.

Membership is open to all steam railways of the United States, Canada, Mexico, Central America and Panama, upon the payment of an annual membership fee of \$10. Each road is entitled to one vote. Each road may be represented at all meetings by the officers in charge of the safety organization of such road, and any or all of his assistants, or such other officers or employees as may be designated by the management.

Two regular meetings are to be held each year, upon the second Tuesday in May and November.

L. F. Shedd, safety supervisor of the Rock Island Lines, Chicago, has been elected temporary secretary, and the executive committee is composed of R. C. Richards, chairman central safety committee, Chicago & North Western, chairman; C. J. Wymer, chairman central safety committee, Chicago & Western Indiana; M. A. Dow, general safety agent, New York Central Lines; J. D. M. Hamilton, claim attorney, Atchison, Topeka & Santa Fe; and W. B. Spaulding, general claim attorney, St. Louis & San Francisco. J. Beaumont, signal engineer of the Chicago Great Western, is chairman of the publicity and entertainment committee, and J. W. Coon, assistant general manager of the Baltimore & Ohio, of the membership committee.

NEW HAVEN OFFICERS' SALUTATORY.*

On September 2, 1913, Howard Elliott, one of the signers of this statement, arrived in New Haven after thirty-three years' service with the Chicago, Burlington & Quincy and Northern Pacific roads. On the same day J. H. Hustis, the other signer of this statement, arrived after thirty-five years' service with the New York Central and Boston & Albany roads.

We have both come into the management of the New Haven road to work with and alongside of you.

We have no purpose except to maintain, operate, and improve the property so that it may do its work with safety to you and the traveling public, and with efficiency and economy for the shippers and owners.

We hope to make our service for this company our life work.

Today we are all involved in this awful casualty, and the men, as well as the management, and the public, are in great distress over it.

Terrible as it is, we must face it with courage, keep our heads, and do our duty.

We are fellow employees—our duties and responsibilities only varying in degree. Each one of us has a great responsibility to the public, to his fellow employees and to the thousands of owners of securities. We need your help, and we wish to help you. Each must help the other if this railroad is to be run safely.

The work of the great army of employees is most important,

*This document, which explains itself, was issued by Messrs. Howard Elliott and J. H. Hustis, president and vice-president of the New York, New Haven & Hartford, on September 6, four days after the disastrous collision at North Haven. Being in some respects of unique character it is reprinted here in full.—EDITOR.

because you are engaged in the detailed work of maintaining the road and in operating trains under the rules and regulations laid down by the public authorities and by the management.

Upon the officers there is imposed by law the duty to adopt and enforce every reasonable rule and practice which experience has shown will help to protect life and preserve property. This is a duty that cannot be shirked, and the management must perform it with firmness and without hesitation.

No railroad can obtain safe operation that does not have the earnest and loyal support of its men in all reasonable efforts to protect and perform the service. There is no question of your loyalty. This loyalty can now be shown in no more practical way than by observing the existing rules and by adopting and accepting cordially any further rules and regulations that make for safety.

It is urged that all employees read and re-read the rules in the timetables and in the books governing the operation of stations, trains, yards, signals, shops, tracks, inspection and care of equipment, in fact everything pertaining to operation, and that they confer with one another and with the officers as to the best means of promoting safety.

Take the case of the accident on the morning of September second. The public will discuss, and properly so, improved signals and stronger equipment, both of which are necessary and desirable as a help in preventing or lessening the horrors of an accident of this kind.

This accident should not, however, and would not have occurred had the rules of the railroad been observed strictly, and good judgment, born of experience, been displayed. The men on the colliding trains were all of sufficient intelligence and experience to understand their duties and were of good habits so far as is known. Certainly their appearance indicated that to be the case. It is believed they are men of sincere purpose and high character, as are the great body of men in engine and train service—men who would not intentionally do a wrong and who take a pride in their work. They all had proper rest, or had been given opportunity for taking it, and were familiar with the piece of road over which they were running. The airbrakes and the signals performed their functions. The conditions of that morning had been duplicated many times before, and there was nothing unusual about it, except that a heavy holiday business was being handled. The operating officers of the road, many of them, had been on duty a greater part of the night, in an earnest effort to see that everything was being handled properly, and were relieved to think that Tuesday morning had come without serious trouble, when the news of this awful accident came shortly after seven o'clock.

There is no intention, or desire, at this time, to place the responsibility for the accident anywhere, but certain facts should be made known to all employees at once so that they may take additional steps to protect themselves, their fellow employees, and the public.

The accident happened within what is known as automatic signal territory. The various rules require a number of specific things:

1. When an engine nears one of these signals set at danger it should stop *before passing the signal* and then proceed.
2. The duties of trainmen and flagmen in the matter of protecting trains, are clearly set out.
3. The responsibility of the conductor for checking up his flagman is also made clear.
4. The duties and responsibility of the engineer are set forth clearly.

It is true that rules cannot be made to cover every contingency, and much must depend upon the intelligence and interest displayed by the particular individual in applying the rules.

There is not, nor can there be, any other duty so important as the protection of a train loaded with human beings.

This piece of road where the accident occurred, has been

operated safely for many years under the same conditions that existed the morning of September second. It is true there was a fog, but that is a condition to be met at certain seasons of the year in places along the sea coast and on many railroads, and in such cases there should be, of course, unusual care and caution exercised.

It is also true that the signal system now protecting the track where the accident happened is being replaced, so that under similar conditions the engineers of both trains would have received a warning signal a mile or more in advance had the home signal shown danger, but the protection of signals, under no circumstances, can relieve the train crews from the duty and responsibility of prompt and accurate flagging.

The flag, fusee and torpedo should be used as if there were no signal system. Every extraordinary stop may be but a short distance from a following train, and the flagman should act quickly at all times, as if the danger were great and his time limited.

While the question of physical condition and ability of the men involved does not enter into this accident, yet as a result of accidents that have occurred, there are certain rules and practices which it is proposed to introduce into the service solely with the idea of increasing safety and operation for the protection of the public and of the employees.

These rules refer to examinations for vision, color sense, hearing, and, under certain conditions, other physical tests. The proposed rules are similar to those that are being used on other standard lines in this eastern territory.

We believe you will agree that this is too serious a matter, not only in the interest of the public, but of yourselves and your families, to be delayed.

Nothing unusual will be required, or expected, and no unnecessary hardships will be entailed, for the railroad needs the experience that comes from years of service, and wants to retain every good man in the service, who is physically competent to perform the duties.

We desire to work with and through those officers of the company who are charged directly with the supervision of the operating department—A. R. Whaley, vice-president; C. L. Bardo, general manager, and the general superintendent, mechanical superintendent, division superintendents, trainmasters and master mechanics, and other operating officers, many of whom come in daily contact with you and who have the same spirit and desire that we believe you have—namely, to do their full duty to those with whom they work, their fellow employees, the patrons of the road, and the owners of its securities.

The New Haven road is a great property, and there is no reason why, with loyal support and hearty co-operation of all, it should not be made the best and safest road in the United States.

Let every man in the service resolve that from this time forth he will redouble his efforts to do his duty, that he will not speak disrespectfully of the road, of his fellow employees, or of the management—that he will welcome just criticism of the service, and do his part to apply remedies that will prevent such criticism, and let all ask the public to aid them in their efforts to disparage unfair and unjust criticism, so that the undivided attention of all employees and men can be in accord with the important work of trying to serve the public with absolute safety.

DIVIDENDS AND CAPITALIZATION OF RAILWAYS IN THE UNITED KINGDOM.—The average rates of dividend paid by the railways of the United Kingdom on the common stock fell from 3.62 per cent. in 1911 to 3.45 per cent. in 1912, and that paid on the preferred stock fell from 3.56 per cent. in 1911 to 3.52 per cent. in 1912. The rates on the other classes of capital remained practically unchanged. The authorized capital of the railways amounted at the close of 1912 to \$6,864,198,250, an increase of \$45,015,125 as compared with 1911. At the close of 1912 the total amount of capital returned as paid up was \$6,496,777,500.

CONGRESS OF REFRIGERATION.

Important Papers Were Presented at the Railway and Steamship Section, Including a Consideration of Pre-Cooling.

The third International Congress of Refrigeration was held at the Hotel LaSalle, Chicago, September 17 to 24. Previous sessions of the congress were held in Paris in 1908, and in Vienna in 1910. A formal opening session was held at Washington, D. C., on September 15, after which the delegates went to Chicago in special trains via the Pennsylvania. The congress at Chicago was divided into six sections which held sessions daily. These were (1) liquefied gases and units; (2), refrigeration machinery and insulating materials; (3), application of refrigeration to food; (4), industrial refrigeration; (5), railroad and steamship refrigeration; (6), legislation.

The meeting of the section on railroad and steamship refrigeration was called to order on Wednesday, September 17, by Vice-president C. M. Secrist, in the absence of the president, W. C. Brown. The following honorary presidents were announced: Juan Carlos Gallegos, Argentine Republic; Robert Dussich, Austria; Pellerin de Latouche, France; R. Habermann, Germany, and D. N. Golownine, Russia. The welcoming remarks of Vice-president Secrist were responded to by Pellerin de Latouche, honorary president.

A paper was presented by J. S. Leeds, manager of the Santa Fe Refrigerator Despatch, on "Organization of Transit Refrigeration," in which the author urged the great need of a comprehensive and essentially distinct department for the supervision of protected service offered to perishable goods in transit. At the conclusion of his paper Mr. Leeds presented the following resolutions:

"It is moved: That the congress approve in principle and so far as practicable, that:

"(a) The protective service such as refrigeration, afforded to perishable goods in large volume, justifies and requires a separate organization or department sufficiently comprehensive to cover all features of that service and attain the highest efficiency.

"(b) In general, the service of refrigerating in transit should be segregated from the service of transportation proper and should be treated as a separate item of expense rather than to be included in the regular transportation rate.

"(c) The service of refrigeration in transit should be charged for on basis of distance or of fixed charges between specified zones rather than on basis of actual weight of ice furnished.

"(d) Consignees of fruits and vegetables and other perishable goods who neglect or refuse to unload insulated cars promptly, should be assessed for such detention a reasonable charge in addition to other customary charges on non-perishable goods in ordinary care."

The meeting on Thursday was called to order by Vice-president C. M. Secrist, who surrendered the chair to the Honorary President M. Pellerin de Latouche, who presided over the session during the presentation of the following papers: Richard Bloch, chief engineer, Orleans Railway, France, Necessity of a Uniform Regulation to Facilitate the Movement of Refrigerator Cars. Richard Bloch, Co-ordination of Efforts Between the Great Navigation Companies and Railways for Refrigerator Transportation. Richard Bloch, Laws and Regulations Relative to the Transportation of Perishable Goods. A. Charron, assistant chief of traffic, French South Railway, Practical Means of Interchanging Refrigerator Cars on Tracks of Different Gage. Maurice Roux, The Progress of Refrigerator Transportation by Water in France.

The first two papers by Richard Bloch were discussed at some length. Remarks were made by Mr. Monteil on means of cooling water in refrigerator cars, concerning which subject a complete paper had been prepared for presentation in full at another section.

Remarks were also made by C. M. Secrist, vice-president Pacific Fruit Express, regarding the importance to American producers, as to the efforts being made at European ports between the steamship lines and the railways to provide continuous refrigeration in transit. Pellerin de Latouche responded to Mr. Secrist's remarks, expressing appreciation of the progress made in refrigeration transportation by American companies, while at the same time predicting that American goods would meet with some competition in the way of perishable goods produced in Europe.

At the remainder of the session Vice-president C. M. Secrist presided, and the following additional papers were read: Macklaier, Method of Protecting Perishable Freight from Loss and Damage by Freezing Weather; and the Use of the Recording Thermometer. A. M. Mortensen, manager transportation service, Panama International Exhibition, Relative Consideration of the Need of a Comprehensive Organization by Transportation Companies. G. C. Bohn, White Enamel Refrigerator Company, Consideration of the Means at Present Employed in Railway Cars for Effecting Refrigeration of Perishable Goods Therein.

The section was called to order on Saturday by Vice-President C. M. Secrist, and the following papers were presented:

Prof. D. N. Golovnine, Moscow—Transportation of Perishable Freight on the Russian Railways; C. M. Secrist, Pacific Fruit Express—Methods of Pre-Cooling Perishable Goods at Loading Points; C. M. Secrist—Initial Icing of Refrigerator Cars by Railroads; C. M. Secrist—Facilities Maintained by Railroads for Replenishing Ice for Refrigeration in Transit; H. M. Wigney, car service agent, Pacific Fruit Express—Consideration of the Necessity of Uniform Regulations to Facilitate and Control the Circulation of Refrigerator Cars in Interstate Commerce, Including Their Possible Transfer in the Loaded State to Boats Over Rivers and Other Bodies of Water; C. J. Beck, freight traffic manager, Hamburg-American Line—Refrigeration on Ocean Steamships; Pedro Berges—Frigorific Transportation by Water; Its History and Development from 1867 to 1913, Especially from the Point of View of the Transportation of Frozen and Refrigerated Meats from the Argentine Republic. The author presented the following draft of conclusions for consideration and possible adoption: The Third International Congress of Refrigeration in Chicago recommends that the governments of the countries adhering to the Congress and interested in this question who have not yet done so should establish an official control of sea transportation of refrigerated foods in order to avoid the loss in reputation to which people engaged in this transport are now subject, and in order to reduce the prices of refrigerated and cold storage meats. They should develop and increase the installation of cold storage houses in the ports of export and import and in the centers of consumption, as well as that they should increase the means of cold storage land transportation.

He recommended to the International Association of Refrigeration that this question of maritime transportation should be included in the program of the next International Congress to take place under its auspices, in addition to the resolutions adopted at the Congress of Vienna, concerning the unification of the methods of inspecting cold storage meats.

At the session on Monday the following papers were presented: Peter Neff, consulting refrigeration engineer—Theory and Practice of Using Ice in Transit to Prevent Freezing of Perishable Goods; Emile Druart—Mechanical Traction of Merchandise and the Use of Trucks on Tramway Tracks for Running Refrigerator Cars over Tracks of Different Gage; W. E. Sharp—The Advantages of a Combination Heater and Refrigerator Car; R.

H. Parks—Dimensions, Proportions, Capacity and Insulation of Refrigerator Cars; Walter B. Pollock, manager marine department New York Central Lines—Transportation of Perishable Goods by Barges; B. W. Redfearn, president Frisco Refrigerator Line—Methods of Pre-Cooling Perishable Goods; H. B. Wood, Gifford Wood Company—Handling Manufactured Ice at Icing Stations.

On Monday afternoon a meeting of the American Association of Refrigeration was held, to which all members of the Congress were invited. On Wednesday the National Poultry, Butter and Egg Association and the American Railway Perishable Freight Association held a joint session with the section on Application of Refrigeration to Food. On Tuesday evening the Congress had a banquet at which all of the edibles were cold storage products, many of them having been shipped under refrigeration from all parts of the world.

The following are abstracts of some of the more important papers which were presented at the railway session:

FACILITIES FOR REPLENISHING ICE FOR REFRIGERATION IN TRANSIT.

By C. M. SECRIST,

Vice-President and General Manager, Pacific Fruit Express Company.

Re-icing stations, as maintained by railroads, can be divided into two classes, the first being plants that are owned and operated exclusively by the railroad, or, by a car line with which the railroad has contracted to handle its perishable business insofar as the furnishing of equipment and refrigeration is concerned; second, plants that are owned and operated by outside concerns under contract with the railroad to furnish ice put into tanks of cars under railroad supervision at a stated price per ton.

In order to minimize loss resulting from the meltage of ice while held in storerooms at these plants, it is now customary in the construction of plants to thoroughly insulate them, particular attention being given to the insulation of the floor and of the ceiling of the storerooms, as well as the sides and ends, and the old practice of using sawdust, hay or other preservatives to prevent the meltage of ice is rapidly being abandoned for the former method, as it has been demonstrated that notwithstanding climatic conditions or cheap original cost of ice, proper insulation of storage rooms fully justifies the additional cost of such construction by the saving made in the meltage of ice.

In order to minimize delays to cars in transit, which require re-icing, and also as a matter of economy in operating the plant, an elevated platform, slightly higher than the top of the car, is built alongside the plant, sufficient to accommodate the business to be handled. These platforms are usually long enough to accommodate from ten to twenty cars at a time, and, it is needless to say, are so located and served by tracks that they will permit cars being placed for re-icing without unnecessary switching. An ideal arrangement is to have the icing platform so located that main line trains can pull by them without any switching.

As a further measure of prompt handling and economy, these platforms are equipped with endless chain conveyors, running their entire length, and the ice is handled out of the house to the platform by elevators. By the use of such modern facilities, a record has been made in some parts of the country of re-icing an entire train load of refrigerator cars with a total detention averaging one minute to a car.

Elevators and carriers mentioned above are usually operated by either gasoline or electric power, the latter being much preferable when practicable as a minimizing danger from fire.

A proper record of all cars re-iced at these stations is kept by a railroad or car line representative, this record including time of arrival and departure, and condition of the ice tanks, that is, quantity of ice in each tank when received and the amount of ice supplied at the station, and which record is sub-

mitted to the proper officer of the company for further handling.

It is customary at these stations to have the drain pipes leading from the ice tanks of cars examined to see that they are open and flowing freely, which is also included in above record and report.

Perhaps mention should be made of the method of handling ice from the platform into the cars, which is done by the use of short skids reaching from the platform to hatch openings in the ice tanks. Employees soon become very expert in handling ice this way, reducing the time consumed to a minimum.

METHODS OF PRE-COOLING PERISHABLE GOODS AT LOADING STATIONS.

By B. W. REDFEARN,

General Perishable Freight Agent, Frisco Lines.

Pre-cooling is unquestionably a forerunner of greater developments in the producing and distributing of perishable freight, as that seems to be its greatest sphere of usefulness. It is proving a material factor in developing production in places that were until recently waste and barren, a supplier of pure and wholesome fruit to the growing consuming centers far removed from a producing territory; and in no small way contributing to the increasing standard of living in the United States.

Pre-cooling is but better refrigeration methods in that it obtains a very desirable condition of low temperature in fruits and vegetables within a very short time after they have been taken from their natural state.

It is safe to say that almost as soon as fruit is picked and removed from its natural state it begins deteriorating unless arrested by bringing it to a low temperature, where it will remain in practically the same condition for a considerable time, varying, of course, with the degree of temperature and nature of the product. It has, therefore, been apparent for some time that in order to obtain the best results, the sooner fruit and vegetables were reduced to that temperature of arrested decay, the more successfully they might be preserved and transported.

For years previous to any work along this line with fruit, the great beef packing industries had been compelled to thoroughly chill and often freeze meat before loading in refrigerator cars for transportation. They also early recognized the necessity of thoroughly cooling the cars before loading. With the temperature of the interior of the refrigerator reduced to as near 32 deg. Fahrenheit (0° C.) as possible or lower, the meat reduced to a lower temperature, it enabled them to ship for long distances, en route several days, and it is but natural that small local slaughter houses should be superseded by the large centrally located and well equipped plants where the work is done more efficiently and economically. With but minor changes, the same method was the first used in the pre-cooling of fruit.

However, the successful transportation and distribution was not the only agency that brought it about.

California is by nature fitted to produce great volumes of the most excellent quality of fruits and vegetables in an almost continuous cycle, from the beginning to the end of the year. The volume of production rapidly outgrew both the facilities of the carriers, or railroads, to transport and the ability of the markets to consume. This condition made it necessary for the growers of citrus fruit to erect refrigerated warehouses, to hold their product against a car shortage or a glutted market, and it was early found that thoroughly cooling the fruit before loading in the cars for transportation had a decided beneficial effect on the carrying qualities. It is but natural that the warehouses should then be utilized to assist in the transportation by pre-cooling.

These refrigerated warehouses are insulated warerooms, served by the usual refrigerating machinery of which there are many types, founded on the same general principle, with some special equipment for quickly and economically handling the boxed fruit.

Such warerooms are, and have been, provided by many of the large poultry and egg producers at the large shipping centers and serve the same useful purpose in handling that important product.

It is clear that warehouse pre-cooling calls for a big expenditure and can never be more than a local proposition at exceptionally large producing points. The producers at the smaller points could neither build on account of the capital required nor take advantage by trans-shipping to a warehouse for pre-cooling. For the hosts of small producers at numerous shipping points, the pre-cooling of fruit after loading in the car at some central point was the only solution of the difficulty and it was obvious that the service must be rendered with co-operation of the carriers or by them.

With very few exceptions, fruit transported by the railroads moves under two separate charges; one charge is for transportation alone; the other to cover the heavy expense of furnishing ice and icing service to the cars en route. This latter expense paid by the shippers or receivers, is in addition to the ordinary freight charges, and is a fixed amount from each shipping point to each destination, the carrier furnishing all ice for initial icing or pre-cooling of car and subsequent re-icing.

It developed that if citrus fruit was thoroughly pre-cooled and loaded in a cold car, the initial icing was sufficient to convey it safely to destination even when the journey consumed eight or ten days in transit without re-icing. This naturally caused the shippers to think that inasmuch as pre-cooling was a factor in reducing the cost of refrigeration in transit to the carriers, they should reap some of the benefits of this saving in a reduced refrigeration charge. The carriers on the other hand were enjoying a reasonable profit on this refrigeration service and in order to protect this source of profit and the big investments, they had, at intermediate stations en route, built plants and offered pre-cooling service after loading of fruit in the cars.

This dispute led to a long drawn out legal controversy between the combined growers on one hand and the carriers or transportation companies on the other, which will doubtless be disposed of in the near future. It is regrettable that this condition prevailed, as it retarded the development of this industry in the field where it would have had the best opportunity for experimental work.

Car pre-cooling is, in a word, simply treating each refrigerator car and its contents as one of numerous separate units or cold storage rooms connected with a central refrigeration producing plant by flexible cold air conduits.

There are two distinct systems that have been extensively developed and used, each with its good merits and ardent supporters. One system known as the "Gay System" and the other as "Intermittent Vacuum Pre-cooling."

The first named might be termed a continuous direct draft of cold air with forced circulation between the packages and contents of the car. The second, an intermittent system of draft of cold air forced into the car by fans causing as high pressure as the loose construction of car will permit, followed intermittently by a period of pumping out and tendency to produce partial vacuum.

It is a well known fact that all fruits and vegetables contain when harvested an amount of latent heat or gases; this latent heat, or gases, is nature's aid in ripening the fruit or vegetables as the case may be. After the article is harvested, in order to prevent deterioration these gases should be removed. This is accomplished by the methods of the intermittent vacuum pre-cooling process.

The equipment of the plant is in a general way the equipment of any modern ice and cold storage plant, and nearly all of the plants of this system are equipped to manufacture ice when not actively pre-cooling cars.

It requires a very large volume of cold air that is obtained by the ammonia pipes placed in two insulated rooms where the air is rapidly cooled to the desired temperature. This cold

air has a forced circulation from a large powerful fan. It is forced through a valve into fixed cold air ducts. It can then be shunted by use of other valves into flexible cold air ducts into the cars to be pre-cooled. These cold air ducts are fastened to the car by a false door that fits tightly into the door frame of the cars. Outlet ducts leading back to the cold air rooms are attached in a similar way to the ice bunker hatches in the roof of car. The intermittent vacuum process then proceeds for a few minutes; the large fan is used as a vacuum pump and draws out the warm air and gases, and causes a circulation even in the center of the fruit packages. This pumping out of air is discontinued by changing the large valves, and automatically the fan in the cooling rooms begins to force cold air by high pressure into the car and on account of the partial vacuum previously created, permeates the very center of all the packages. This system can therefore claim to give two very useful results—one withdrawing the impure gas and air, second creating a strong forced circulation, accomplishing quick cooling—the latter very much to be desired.

The future of pre-cooling fruits, vegetables and meat products is assured. It is a prime necessity in the proper distribution of our food products and, in my opinion, one of the two movements for lasting good in the agricultural world today, and provides a better method of distribution and a larger area for marketing.

ORGANIZATION FOR HANDLING REFRIGERATION TRANSPORTATION.

By J. S. LEEDS,

Manager, Santa Fe Refrigerator Despatch Company.

A complete and dependable organization is necessary to successfully transport perishable commodities to markets in a country as extended as the United States and Canada, embracing an expanse from the Atlantic to the Pacific ocean, and from the gulf of Mexico to Canada, inclusive. The production embraces all of the fruits and vegetables grown in the temperate zone, and movement embraces all of the months of the year. The growth in the consumption of fresh fruits and vegetables has reached such proportions that it is now a necessity to place on the tables of all of the people at all seasons of the year the product of any part of the United States, Canada and Mexico, the movement being almost wholly by railroad transportation and interchangeable according to the season and the point of production.

In order that this may be successfully accomplished, the goods must be placed in the hands of the consumer in a wholesome and sanitary condition, in a state of perfection as to maturity or ripeness, and undeteriorated. Long distances covering hundreds or even thousands of miles are embraced in the movement from the producer to the consumer. Protection against weather or climatic conditions embracing wide ranges of temperature must be overcome.

The cars for the purpose must be suitable vehicles specially constructed and strong enough to withstand the transportation in heavy trains over heavy grades, with safety to the property they carry. They must be assembled within the district of production, cleaned and put in perfect sanitary and physical condition for use, and supplied in sufficient numbers to promptly meet all demands. These requirements must be estimated and anticipated in advance of the orders of shippers for cars so that the equipment may be available when wanted. This requirement is especially true with respect to large blocks of perishable commodities to be moved over long distances and embracing a wide distribution to numerous markets. A failure to meet promptly the demands with the necessary equipment involves the carriers in a serious liability for damages to the extent of the value of the property tendered for shipment. To supply the necessary equipment involves the assembling and movement of large numbers of empty cars frequently in full trains and on expedited time.

To market a single crop, such as berries, peaches and other deciduous fruits, covers a period of forty to sixty days. In such

cases a single car can make no more than one or two trips on a single crop. Unless a carrier has a succession of crops of perishable freight, other service for the equipment must be planned and secured, and the cars moved to each succeeding field of operation.

California produces a large variety of crops and covers in the marketing the whole country embraced in the United States and Canada, and embraces the whole year, fluctuating widely as to volume at different periods, ranging from a few carloads to 300 or 400 cars per day. The movement of a car normally for a round trip in marketing a single carload of that product will average approximately eighty days. During the year all other crops, composed of berries, peaches, pears, cantaloupes and summer vegetables are provided for in their season.

Along with the car supply must be provided an adequate quantity of ice to meet requirements at stations where needed. Much of the fruit and vegetables require pre-iced cars to insure the safe transportation of the commodity. Such cars are iced at the icing station most convenient to the shipping station. They are distributed and placed at the loading stations and when loaded are replenished to the full capacity of the ice bunkers at the first icing station in transit, generally at the point where car was initially iced, after which the re-icing is accomplished at suitable intervals at regular icing stations, approximately once each twenty-four hours, the intent being to keep the bunkers as well filled as possible; and while there is no established danger point as to the quantity of ice to maintain, the rule generally observed is that bunkers shall not sink below half full while the car is in transit. A good rule for good work is that ice ought not go below the level of the top of the load in the car.

The ice supply is as imperative and the requirement at the hand of the carrier as pressing as is the supply of cars to cover the demands in the prompt movement of the crop. These two demands upon the carrier are as urgent and must be provided for as promptly as a payment at the bank when an obligation is due.

In order to do this, icing stations are maintained at intervals of twenty-four to thirty hours apart. Carriers must be prepared to meet all of the contingencies that come up, such as detentions from washouts, derailments, blockades, so that they can properly protect the property. A code of rules is in force covering the case as fully as possible in such way that property is protected and the service is applied without reference to anyone for further authority. The rules are automatically and continuously in effect; the necessary supervisory force is constantly on duty and the labor and accessories are at hand to meet the demands of the service. For this purpose inspectors are maintained to insure that proper icing is performed; also to make and preserve in permanent file the service record for reference at any future time when it may be needed.

As an adjunct of refrigeration, pre-cooling applied to loaded cars has been in operation for a period of two or three years. Three pre-cooling plants of large capacity in California and one plant in Texas have been in operation, and the results obtained have been successful and satisfactory to all parties interested. In addition to the above, small plants of various types have been operated at many points, mainly by individual shippers, and with varying results. This work has been more or less experimental.

Pre-cooling is no doubt destined to become an important factor in transportation refrigeration, especially in the case of the more tender deciduous fruits which are obviously more susceptible to successful treatment and with larger benefit to shippers than the less perishable citrus fruits.

The telegraphic "consists" of trains carrying cars of perishable freight under ice are sent to headquarters of the line, and reports of passing the principal district terminals or junctions are transmitted and consignees at destination or terminals are advised of the progress of their cars, thus enabling them to place the goods on the market or file orders for diversions to the markets in which they may desire to place the commodities. Cars at destination are properly iced and cared for until disposed of with-

out previous or additional orders to do so. All of the accessorial transportation service is assumed and performed as provided for in the legally issued tariffs of the carriers. These tariffs are issued jointly, or are concurred in, and through billing accompanies the cars. Thorough icing arrangements are in effect, the initial carrier originating the instructions to cover from point of origin to final destination, including all icing or expense in such way as to have the total assessed against the property upon final delivery. In order to expedite the movement, an accepted bond of indemnity is in many cases executed, covering all reasonable contingencies. The carriers of a large proportion of perishable freight undertake to supply the refrigeration to all destinations at a fixed price (more or less according to the point of destination), and all expense for icing in transit is collected from the initial carrier, so that the shipper knows at the point of origin what the refrigeration expense will be upon delivery of the goods to the consignee at destination. In this way the shipper knows at the start the quality of service he may depend upon and what the expense will be from point of origin to any market large enough to consume or dispose of a carload of product anywhere in the United States or Canada.

A system of daily reports is rendered from all of the principal icing stations and from all junction points of the originating line with other roads, noting the date and hour of arrival and departure of cars, quantity of ice in the ice bunkers on arrival and departure, and the outside temperature.

The rules governing the conduct of the traffic in transit are made as arbitrary as possible so that nothing which can be covered in the instructions on the waybill is left to the judgment of employees, who may be more or less inexperienced in the requirements.

As much advance information as possible concerning the number of cars to be iced is forwarded, either by wire or by passenger train, ahead of the freight train in which cars are moving, to icing and inspection points, in order that the necessary ice may be on the platform, and the employees ready for service upon arrival of the cars to be iced, thus obviating unnecessary detention.

All of the principal routes in the United States and Canada are equipped with facilities for supplying ice and the re-icing of cars to such an extent that icing and refrigeration tariffs, when published, are made for state-wide application by all originating carriers, and in such a way that a dependable supply of ice is always at hand to meet all requirements. Such points are designated as regular icing stations, and the information is published in circulars which are placed in the hands of agents at originating points, and are available to shippers. In addition to this, there are numerous auxiliary icing stations at which a supply may be had in cases of detention or emergency. The standard rules of universal application provide that in cases of detention at points other than regular or auxiliary icing stations, a supply must be obtained from any available source, either at the station or by train from some adjacent point, the idea conveyed being that the property must be protected. The general plan is now so extended that it is a remote probability that a car of perishable freight may pass from point of origin to market without complete refrigeration protection. Some conception of the wide scope and the completeness of the organization required may be had when the fact is realized that much of the business moves over long distances, covering two or more roads, the distances ranging from the limit of one state to the length and breadth of the United States and Canada. The range of commodity is as varied as the distances covered.

The organization for handling the business has been developed as the necessities of the business have demanded, and has not been worked out by any well defined and predigested plan. It is largely the result of individual effort, as the requirements for service in reaching the more remote markets with a rapidly increasing volume of production have developed, and from a rapidly developing demand for the commodities in districts where the commodity is not in season or where it is not produced at all.

Much of the operation is crude and more or less cumbersome, resulting in some lack of economy in the conservation of the revenue of the carriers. The competition between carriers and the requirements of the business has resulted in carrying out the theory of perfection of service which obviously is necessary in the transportation of highly perishable commodities and without much regard to economy in the expense of doing it.

The wide distribution of perishable food commodities throughout the whole country has developed rapidly and to some extent in advance of actual demand, much of the product seeking the market, instead of the market seeking a supply. The carriers, and incidentally the refrigerator lines, have individually and collectively taken an active part in projecting the trade to the utmost extent possible. The details of the service have been brought to a high state of perfection. Tariffs and rules governing it have been prepared and published, and a great deal of attention given to uniformity of practice.

These things have been accomplished very largely up to the present time by individual efforts of carriers, producers, and shippers representing certain districts and zones of production, and have had the effect of stimulating production. Improvement in marketing facilities has produced a more universal demand for such products. The distribution area is constantly widening and extending. The discrimination on the part of consumers as to quality and condition is growing closer each succeeding season. This demands more perfect service, taxing to the utmost the ingenuity of all parties who are engaged in handling the products (especially the transportation) to devise ways and means of performing the service in an acceptable manner. The supplying of the markets covers every hamlet in the whole country which can be reached with transportation facilities by steam or electric roads or by water carriers. This at least suggests, if it does not require, an organization which comprehends the whole country embraced within the limits of the transportation system of the United States, Canada and Mexico, in order to accomplish the things necessary to be done. This must embrace all of the accessory service which must be anticipated and ready for use at all times and at available points, and must be uniformly the same to all shippers.

The organization of this highly specialized service for perishable products is a trade within itself, separate and distinct from other branches of transportation. The movement of commodities must be accomplished without detention between the point of origin and point of consumption, generally in the same car in which the goods were originally loaded. Usually a large number of changes of destination are allowed in order to avoid overstocked or glutted markets. These changes are accomplished with a minimum of detention, in many cases without any delay, where orders for the change are placed in advance of the arrival of cars at first way-billed destination. Barring extraordinary circumstances, such as derailments, floods, or other unavoidable causes, the cars move with regularity so that shippers may calculate with reasonable certainty when they will reach the destination for which they are intended. Taking into account the inherent nature of the fruit or vegetables, a very close calculation may also be made as to their condition on reaching market. Loss and damage on account of improper or insufficient refrigeration in transit on properly handled products before and during transit is rapidly being reduced to a minimum.

The foregoing is an ideal way to conduct the transportation and handling of perishable products, and is in practice on individual roads handling large blocks of business. It is what a comprehensive organization covering all of the producing districts should be able to promise to the producers and shippers of all of that class of traffic where the movement is regular and sufficient to justify it.

Some of the features which a comprehensive organization would necessarily embrace are indicated as follows:

First—They should be authorized to prepare or compile and publish suitable rules governing as uniformly as possible, all phases of the service to be performed by the carriers.

Second—(a) To prepare by suitable committees, and publish local and joint icing and refrigeration charges. (b) All accessory service rules and charges, including heated car service in cold weather and detention charges as may be found necessary to expedite the disposition of commodities and secure the prompt release of cars and their return to service.

Third—To so promulgate rules, rates and regulations as to enable agents, producers and shippers to obtain definite information as to rates and service to markets which the shippers may desire to reach.

Fourth—To promote the performance of everything pertaining to the handling of perishable products required by law to be performed by the carriers.

Fifth—To co-operate with shippers in the comprehensive and equitable distribution of perishable products to all markets, to the end that demands may at all times be fully supplied as far as may lawfully be done by the carriers.

Sixth—To promote and preserve equitable relations between shippers and carriers in all phases of the service in the handling and care of perishable freight, including legal obligations and liability under the law.

Seventh—To aid in the study and disposition of special matters by procuring and compiling authentic information, and the dissemination thereof, relating to perishable products.

An organization to properly conduct the business must necessarily cover all phases of the service, which will embrace refrigeration, ventilation, heated car service, and such initial and terminal service as will enable producers and shippers to proceed with confidence that their business will be properly safeguarded and that nothing will be left undone for the proper and safe conduct of the business which may logically be the duty of the transportation interests to perform.

LARGE PASSENGER LOCOMOTIVES FOR THE C. & O.

The Chesapeake & Ohio has recently received from the Baldwin Locomotive Works, eight Pacific type locomotives which are of special interest because of their capacity, design, and the difficult service conditions under which they are to operate. They will be used on the Allegheny district of the Hinton division, between Clifton Forge and Hinton, W. Va.* The ruling grade, eastbound, is 30 ft. to the mile for a distance of 16 miles; while westbound it is 60 ft. to the mile for a distance of 13½ miles. The new locomotives are designed to haul a train of ten cars, weighing 692 tons, over the division without assistance, maintaining an average speed of 24 miles an hour over the 60-ft. grade. Heretofore, when using Pacific type locomotives, it has been necessary to double-head trains of this weight.

The new engines have a tractive effort of 44,000 lbs., and with 179,900 lbs. on drivers, the ratio of adhesion is 4.08. The equivalent total heating surface, making the usual allowance for the superheater, is 5,105 sq. ft., or 276 sq. ft. per cubic foot of cylinder volume. These ratios indicate that the weight on driving wheels is fully utilized for tractive purposes, and that the steaming capacity is ample for severe duty.

The boiler is of the extended wagon-top type, measuring 78 in. in diameter at the front end and 85½ in. at the dome ring. The firebox is radially stayed, and the front end of the crown is supported from a single T-bar hung on expansion links. A total of 460 flexible stays are placed in the throat, sides and back head. The furnace is equipped with a brick arch, and the fire door and grate shaker are pneumatically operated. The superheater is of the Schmidt type, and the large boiler flues numbering 36, are grouped in four horizontal and nine vertical rows; outside steam pipes convey the steam to the cylinders. The steam distribution is controlled by 16-in. piston valves.

The frames are vanadium steel castings, with separate rear

*For description of Chesapeake & Ohio Mountain (4-8-2) type passenger locomotive see *Railway Age Gazette*, September 22, 1911, page 555.

sections of slab form. The main frames are braced, just ahead of the leading driving pedestals, by a large steel casting which, in addition to acting as a cross tie, supports the driving brake shaft. The upper frame rails, between the first and second pairs of drivers, are braced by the valve motion bearer, and between the second and third pairs by a broad steel casting which supports a boiler waist sheet. The splice between the main and rear frame sections is strengthened by a large transverse brace. This contains a suitable pocket for the radius bar pin of the rear truck, and carries the vertical expansion plate supporting the front end of the firebox. Transverse braces are also applied at the main driving pedestals. The main driving journals are 11½ in. x 22 in., and the boxes are of the Cole pattern.

Vanadium steel is used for the main and side rods, and also for the rod straps; and heat treated steel for the piston rods, crank pins, driving axles and engine truck axles.

Preliminary trials with these locomotives indicate that they will be fully capable of meeting the service requirements. In both steaming and hauling capacity they rank among the most powerful six-coupled locomotives yet built, and they illustrate the exceptional capacity that can be obtained in the Pacific type, when track conditions permit high wheel-loads to be carried.

The general dimensions are given in the following table:

General Data.

Gage	4 ft. 8½ in.
Service	Passenger
Fuel	Bit. coal
Tractive effort	44,000 lbs.
Weight in working order	282,000 lbs.
Weight on drivers	179,900 lbs.
Weight on leading truck	51,300 lbs.
Weight on trailing truck	50,800 lbs.
Weight of engine and tender in working order	443,000 lbs.
Wheel base, driving	13 ft.
Wheel base, total	34 ft. 1 in.
Wheel base, engine and tender	67 ft. 11½ in.

Ratios.

Weight on drivers ÷ tractive effort	4.08
Total weight ÷ tractive effort	6.40
Tractive effort X diam. drivers ÷ heating surface*	629.00
Heating surface* ÷ grate area	85.80
Firebox heating surface ÷ evaporating heating surface, per cent.	6.60
Weight on drivers ÷ heating surface*	35.10
Total weight ÷ heating surface*	55.00
Volume both cylinders, cu. ft.	18.54
Heating surface* ÷ vol. cylinders	276.00
Grate area ÷ vol. cylinders	3.21

Cylinders.

Kind	Simple
Diameter and stroke	27 in. x 28 in.

Valves.

Kind	Piston
Diameter	16 in.
Lead	¼ in.

Wheels.

Driving, diameter over tires	73 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	11½ in. x 22 in.
Driving journals, others, diameter and length	10½ in. x 14 in.
Engine truck wheels, diameter	33 in.
Engine truck, journals	6 in. x 12 in.
Trailing truck wheels, diameter	49 in.
Trailing truck, journals	8 in. x 14 in.

Boiler.

Style	W. T.
Working pressure	185 lbs.
Outside diameter of first ring	.78 in.
Firebox, length and width	114 in. x 75½ in.
Firebox plates, thickness	¾ in. and ½ in.
Firebox, water space	F. 5 in. S. & B. 4½ in.
Tubes, number and outside diameter	206-214 in.
Tubes, thickness	.125 in.
Flues, number and outside diameter	36-5½ in.
Flues, thickness	.15 in.
Tubes and flues, length	20 ft. 6 in.
Heating surface, tubes	3,535 sq. ft.
Heating surface, firebox	220 sq. ft.
Heating surface, arch tubes	31 sq. ft.
Heating surface, total	3,786 sq. ft.
Superheater heating surface	879 sq. ft.
Grate area	59.6 sq. ft.

Tender.

Wheels, diameter	36 in.
Journals, diameter and length	6 in. x 11 in.
Water capacity	8,000 gals.
Coal capacity	14 tons

*Equivalent heating surface equals evaporating surface (3,786 sq. ft.) plus 1.5 times superheater surface (879 sq. ft.), equals 5,105 sq. ft.

EXPORT OF BRITISH AND AMERICAN RAILWAY EQUIPMENT.*

American manufacturers of railway equipment have not been receiving their proper share of equipment orders of foreign railways. Railroad development in the older countries of Europe

EXPORTS OF AMERICAN LOCOMOTIVES.

Exports to—	1908	1909	1910	1911	1912	First 10 months 1913.
Europe	134,552	683,086	2,948	8,430	24,909	
Canada	775,833	364,254	255,504	345,618	476,216	1,018,027
Central America	101,980	227,491	90,198	142,333	42,133	66,835
Mexico	1,073,970	259,621	412,447	623,159	115,221	62,441
Cuba	594,198	149,090	122,749	153,967	280,786	373,206
Other West Indies	51,365	7,150	37,810	59,495	52,573	
South America:						
Argentina	169,315	809,475	107,623	111,262	9,980	
Bolivia		57,500		2,000	15,410	
Brazil	622,395	509,241	1,043,383	1,199,601	1,246,824	2,076,480
Chile	867,035	22,579	45,779	51,900	56,891	
Colombia	95,644	84,755	33,793	68,023	40,030	
Ecuador	5,805	14,405	14,950	15,900	13,750	
Paraguay	9,805	42,110		11,875		
Peru	69,708			4,988	18,243	
Uruguay					6,445	
Venezuela					6,445	
China	109,935	60,800	102,755	147,700	65,125	129,075
China-Japanese leased territory	3,059,873	59,000			84,375	
Japan and Chosen (Korea)	737,799	17,820	29,683	615,052	223,111	1,302,346
Australasia	37,441	5,895	9,962	21,948	348,826	
Philippines	63,882	22,111	6,636	19,855	4,922	
Africa	13,800	2,587	88,785	417,700	177,875	
Other	35,745	86,759		32,850	18,000	171,011
Total	8,626,574	3,497,650	2,404,619	3,953,648	3,298,182	4,576,330

¹Includes some of the countries given in the left-hand column.

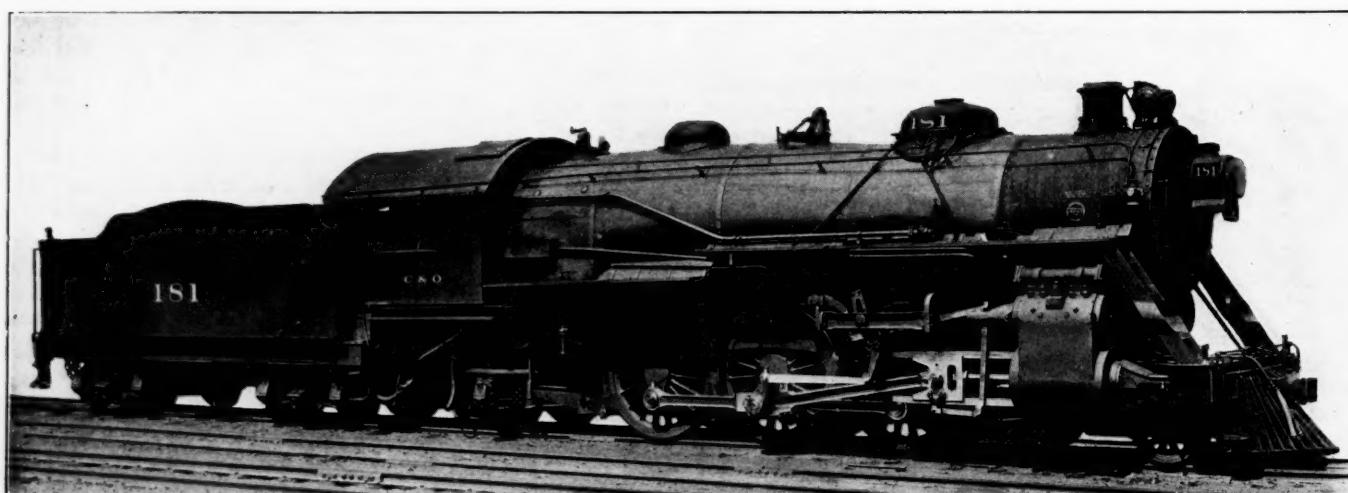
²Includes steam and electric locomotives.

³Does not include the \$88,902 worth of electric locomotives exported.

⁴Steam locomotives only.

has been along lines radically different from those in the United States and distinct types of rolling stock have consequently

*Taken from Foreign Markets for Railway Supplies and Equipment, published by the Bureau of Foreign and Domestic Commerce, Washington, D. C.



Pacific Type Passenger Locomotive for the Chesapeake & Ohio.

been evolved. American locomotives have been tried in a few European countries but it is claimed that they have not proved as satisfactory as the European models. In countries where railroads are a more recent development the capital has to a large extent been furnished by a few of the more important European countries, with the natural result that orders for rolling stock and other supplies are given to the country furnishing the necessary capital.

The value of American freight and passenger cars exported in the fiscal year 1908 was \$8,560,263; in 1909, \$3,464,952; in 1910, \$2,192,282; in 1911, \$5,472,648; in 1912, \$7,393,787, and in the first ten months of the fiscal year 1913, \$8,299,848. These figures compare with \$10,416,050 worth of British freight and passenger cars exported in 1910; \$9,408,428 in 1911, and \$12,947,997 in 1912. The figures for export of British and American locomotives are given in the accompanying tables. It will be seen that 1908 was the best year for American exports and that 1910 was the poorest. Since 1910 exports have been increasing and

EXPORTS OF BRITISH STEAM LOCOMOTIVES.

Exports to—	1910	1911	1912
Netherlands.....	134,185	47,386	2,151
France.....	130,333	1,106,518	25,647
Portuguese West Africa.....	47,289	629	97
Portuguese India.....	79,733	154,517	73,377
Spain.....	163,004	97,461	133,518
Turkey.....	30,747	180,699	12,283
Egypt.....	110,178	233,091	132,467
China.....	306,122	242,187	28,625
Japan.....	283,809	782,193	123,644
Philippines.....	10,653	64,462	24,196
Mexico.....	15,000	95,374	3,076
Peru.....	18,970	64,486	10,122
Chile.....	162,245	576,559	339,137
Brazil.....	496,390	653,420	674,388
Uruguay.....	226,215	23,344	41,590
Argentina.....	2,457,271	2,028,185	2,631,939
Other foreign countries.....	250,000	187,720	855,322
South Africa.....	1,342,449	331,845	821,344
India.....	1,609,235	2,511,228	1,881,231
Straits Settlements.....	32,241	87,583	23,680
Australia.....	78,137	875,654	1,872,342
Other British possessions.....	422,548	722,520	689,002
Total.....	8,310,759	11,230,040	10,399,778

1913 promises to be the record year for cars, if not for locomotives.

At present the need of foreign railways for new equipment is very pressing. In this connection the Manchester *Guardian* said recently, after telling of the congestion in the English car building plants: "The demand upon them is accentuated by the requirements of colonial railways. In the west coast of Africa district no one seems to have been prepared for the great flow of business which would ensue on the opening of railways. The congestion on the newest line running from Kano, the railhead in northern Nigeria, to the Niger river has been enormous. Cars have been placed on order with home firms which will take twelve or fifteen months to deliver so that no immediate relief may be looked for. The same thing is true of the Indian railways. The shortage of rolling stock for the trunk systems of India and Burma is inflicting a great loss and hardship on the commercial community. Great sums of money are being devoted to making good the deficiency. The great Argentine and Brazilian railway systems are constant buyers of rolling stock, placing large orders. There really seems to be a good opening for car builders as the way in which the world is opening out for railway traffic in all directions insures a constant demand in excess of the ordinary supply for many years to come."

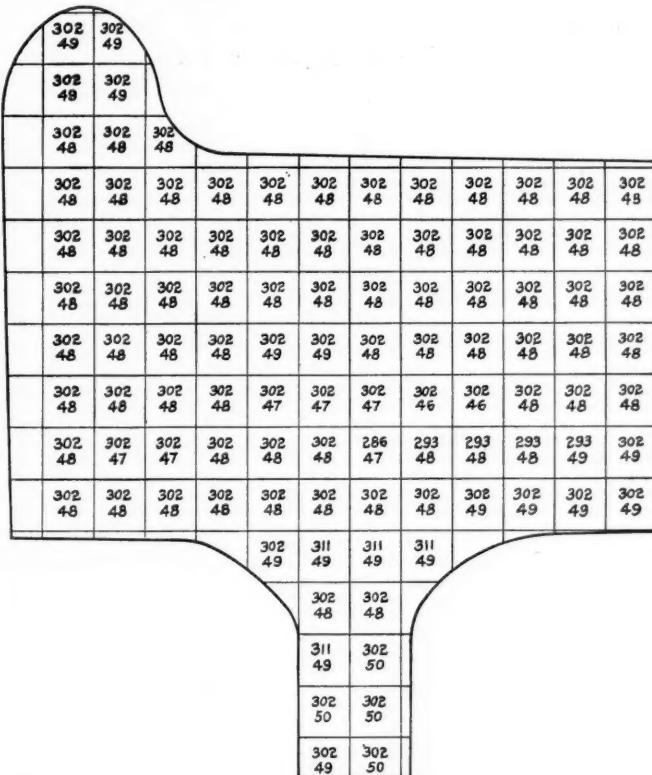
RAILWAY ACTIVITY IN THE FRENCH CONGO.—According to a report published in Paris, the French government has agreed to a loan of \$35,000,000, required mainly for the construction of railways in the French Congo, and the scheme will probably be passed during the next session of the chamber of deputies. The new railways will include lines from Pointe Noire to Brazzaville, 362 miles; from Bangui to Fort Crampel, 216 miles, and from Ndjole to Kandjama, 193 miles. About \$2,500,000 is to be devoted to harbors and waterways and to wireless and ordinary telegraph systems.

DROP TEST OF HEAT TREATED CHROME VANADIUM WHEELS.

An order for 400 heat-treated chrome-vanadium rolled steel wheels was recently placed by the Grand Trunk for the tenders of 50 Mikado type locomotives now building at the Montreal Locomotive Works. These tenders have a capacity of 9,000 gal. of water and 15 tons of coal. With a full load of coal and water, the estimated weight is 172,000 lbs., which gives an average load of 21,500 lbs. per wheel on the rail.

Some of these wheels, oil-treated in accordance with the manufacturers' approved practice, have recently been finished by the Standard Steel Works Company, and in order to thoroughly determine the strength and toughness of this type of wheel, severe drop tests in addition to the usual physical tests and chemical analyses were made of wheels selected at random. As these are the first tests of this character made on wheels of this kind, the results are of special interest. The wheels were made from two 50-ton heats of acid open-hearth steel. One wheel from each heat, numbers 9686 and 9683, was tested, the results being remarkably uniform. It was the original intention to test three wheels under the drop, one in a running position, one with the concave side of the plate up and one with the convex side of the plate up.

In the first test the wheel, made from heat 9686, was placed



Results of Hardness Tests by the Brinell and Scleroscope Methods.

in a horizontal position and tested to destruction. In this test, though twice reversed, the wheel withstood a total of 1,254,000 foot-pounds before cracking or breaking. It was first placed under the drop with the concave or dished face of the plate up, in which position it offers least resistance to a blow or thrust. In this position it withstood without fracture or deflection the following blows from a 2,240 lb. tup dropping on the face of the hub and equivalent to a total of 515,200 foot-pounds of energy:

1 blow at 5 ft. 1 blow at 15 ft. 6 blows at 30 ft.
1 blow at 10 ft. 1 blow at 20 ft.

It was then placed with the convex side up, or in the position of its greatest resistance to side thrust. In this position

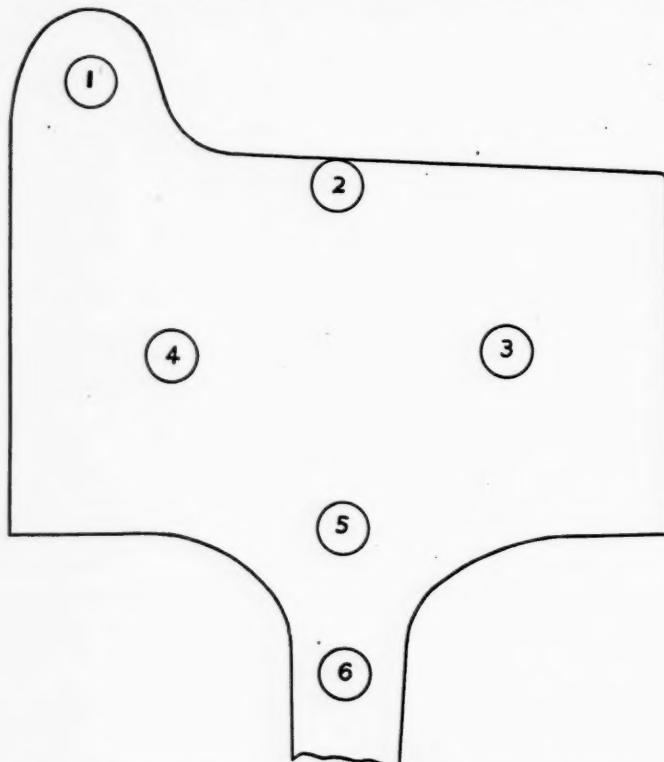
it was subjected without failure to 10 blows from a height of 30 ft., equivalent to 672,000 foot-pounds. Following this, the wheel was again placed in its original position and given one blow at 30 ft., at which it broke in four pieces. The accompanying illustration of one of the broken pieces shows the stringy, tough structure of the metal.

Following the drop test, the wheel was cut up and test pieces to determine the physical properties were taken tangentially from various points in the tread as shown in another of the illustrations. Physical tests of a piece taken across the rim from front to back were also made by the American Vanadium Company. The properties as shown by these various tests are given in Table 1. The chemical composition of the steel as shown by analysis is given in Table 2.

TABLE 1.—PHYSICAL PROPERTIES OF HEAT TREATED CHROME-VANADIUM ROLLED STEEL WHEELS.

Test No.	per sq. in.	(Heat 9686)		
		Elastic limit. Lbs.	Tensile strength. Lbs. per sq. in.	Elongation in 2 in.
1	84,000	147,000	18.0 per cent.	43.5 per cent.
2	81,500	147,000	17.5 per cent.	34.0 per cent.
3	80,500	146,000	13.5 per cent.	29.5 per cent.
4	82,000	145,500	13.5 per cent.	36.0 per cent.
5	89,500	150,000	12.5 per cent.	31.0 per cent.
Across rim (front to back)...		103,200	145,000	10.0 per cent.
6	100,000	148,000	14.5 per cent.	37.5 per cent.
(Heat 9683)				
1	87,000	153,500	12.0 per cent.	26.0 per cent.
2	119,000	167,500	12.0 per cent.	29.5 per cent.

Hardness tests both by the Brinell and Scleroscope methods were made by the American Vanadium Company on a



Points at Which Test Pieces Were Taken to Determine the Physical Properties of the Steel.

section of the wheel which included the entire rim and a portion of the plate. Both hardness tests were made at intervals of $\frac{3}{8}$ in. over the entire section. The results are shown in one of the illustrations. As will be seen, the wheel shows a Brinell hardness of 302 and a Scleroscope of 48, practically uniform throughout the entire section, though a slightly higher degree of hardness was detected in the plate by the Scleroscope.

In the drop test of the second wheel, the wheel was first placed in a horizontal position with the concave face of the

plate up, the same as in the original position in the first test. In this position it was subjected to ten blows from the tup dropped from a height of 30 ft. on the face of the hub, equivalent to 672,000 foot-pounds. Under this treatment, no crack or fracture developed. It was then placed in a vertical or running position and given ten blows from a height of 30 ft. on the tread without any deflection or crack. At this point the tests were discontinued, as their severity had broken the drop test machine.

The physical properties of this wheel, made from heat 9683, as shown by tests made from pieces taken at the points shown in the illustration, are given in Table 1, while the chemical analysis is included in Table 2. As the two wheels met all the tests planned, no test was made of the third wheel which had been selected.

TABLE 2.—CHEMICAL COMPOSITION OF CHROME-VANADIUM WHEELS.

Heat No.	Carbon	Silicon	Phosphorus	Manganese	Sulphur	Chromium	Vanadium
9686...	.654	.30	.039	.63	.047	.992	.16
9683...	.603	.345	.032	.63	.048	.984	.16

Specifications have been adopted by the Standard Steel Works Company for heat treated chrome-vanadium wheels



Piece from Wheel Broken in Testing, Showing the Structure of the Metal.

for both steam and electric railway service. Except in the matter of tolerances, the two sets of specifications are practically identical and are in part as follows:

1.—Process: The steel shall be made by the acid open-hearth process.

2.—Discard: A sufficient discard shall be made from each ingot to insure freedom from injurious piping and segregation.

3.—Heat treatment: The wheels shall be allowed to become cold after rolling; shall be re-heated to the proper temperature to refine the grain and quenched in oil, and then re-heated to the proper temperature for tempering or drawing back.

4.—Chemical composition: The steel shall conform to the following requirements as to chemical composition:

Carbon .....	.50 to .65 per cent.	Vanadium	Over .16 per cent.
Manganese ..	.55 to .80 per cent.	Phosphorus ..	Not over .05 per cent.
Silicon .....	.15 to .35 per cent.	Sulphur ..	Not over .05 per cent.
Chromium ..	.80 to 1.10 per cent.		

RAILWAY EARNINGS IN THE UNITED KINGDOM.—The total receipts from passenger and freight traffic in the United Kingdom in 1912 amounted to \$575,755,615, which represented the sum of \$24,561 per mile of line open for traffic at the end of the year, as against \$24,366 per mile in 1911. Although there was a decline in the tonnage of merchandise and minerals, and although fewer passengers were carried, the gross receipts for 1912 were the highest ever recorded in the history of British railways and showed a gain of about \$1,459,950 over 1911 for passenger traffic and approximately \$3,747,200 for freight traffic. Notwithstanding the significant falling off in the number of passengers carried as compared with 1911, the receipts from third-class passengers were larger than those of any previous year. A portion of the increase in the passenger receipts is attributed to the higher charges made for season, week-end, excursion, and other tickets which are issued at cheap rates. The total gross receipts of the British railways in 1912 approximated \$625,603,174, and the operating amounted to \$395,276,596. The net receipts were \$230,326,578 as compared with \$236,424,303 in 1911.

General News.

The New York, New Haven & Hartford has been summoned to explain in the police court, at New York City, why it disobeys the law of New York, requiring that telegraphers shall be allowed two days off each month.

President Daniel Willard, of the Baltimore & Ohio, has ordered that no intoxicating liquors be carried or served in his official car. President Willard aims to set an example of respect for the rules of the operating department.

An appeal is made to the public by the Pennsylvania railroad to "stop, look, and listen." That is all very well for the part of the public which goes on foot or drives milk carts, but as for the automobilists, ought not the express trains to stop, look and listen for the honk?—*Springfield Republican*.

The semi-annual meeting of representatives of the operating, traffic and freight claim departments of the Atchison, Topeka & Santa Fe to discuss plans for reducing loss and damage to freight will be held at St. Joseph, Mo., on September 30. F. A. Lehman, assistant to Vice-President Storey, is chairman of a loss and damage committee.

The Southern Pacific has posted on every station bulletin board and in all of its freight offices copies of the letter issued by the California State Railroad Commission calling on shippers to promptly load and unload freight cars to prevent a shortage. Beneficial results from appeals sent out by commercial bodies in California are already evident.

William J. Borland has been appointed safety engineer of the Western Maryland, and has been instructed to organize "Safety First" committees on all divisions of the road. Mr. Borland, who is the son of W. P. Borland, assistant chief of the safety appliance division of the Interstate Commerce Commission, has had experience in railroad work and also on the editorial staff of the *Baltimore American*.

Prof. Henry C. Adams, of the University of Michigan, is going to China to act as adviser to a governmental commission which has been appointed to standardize the accounts and records of the government railroads. He will sail October 9. It was announced recently that Professor Adams had been appointed a member of the Board which is to advise the Interstate Commerce Commission on valuation matters.

The Electric Division of the New York Central & Hudson River now extends on the main line from New York northward to Harmon, 33 miles, and a considerable number of through trains change engines at Harmon, instead of High Bridge, as formerly. Seven additional trains were put on this schedule this week. The northbound Empire State express, which for several years has stopped at High Bridge, now passes that place without stopping and makes a stop at Harmon.

Timothy J. Sullivan, of Springfield, Mass., has signed a contract with New York capitalists to go to San Domingo, to superintend the construction of 180 miles of railroad and an extensive mileage of wagon road, the plan, as a whole, contemplating the expenditure of \$20,000,000. Mr. Sullivan was formerly roadmaster on the Boston & Albany, but left railroad service in 1905, and since then has been a retail coal dealer in Springfield. His contract binds him to stay in San Domingo four years at \$12,000 a year.

The Arbitration Board, considering trainmen's wages, has continued hearing testimony in favor of the conductors and trainmen concluding that part of its work on Wednesday of this week. Facts and arguments were presented by Charles S. Brigham, a passenger conductor of the New York, New Haven & Hartford; Claude Dillon, a freight conductor of the Baltimore & Ohio, W. J. Burke, of the same road; J. J. Foster, a yard brakeman of the Buffalo, Rochester & Pittsburgh, and H. B. Schwab, a brakeman on the Pennsylvania.

Near Wileys, Ohio, on September 9, the westbound "24 hour St. Louis" express of the Pennsylvania, train No. 31, was derailed, and one car was overturned. All the cars were of steel and no passenger was killed. The fireman was fatally scalded and 14 passengers, 10 dining car employees, 7 Pullman employees

and two postal clerks were injured. This part of the road was not washed out in the March floods, as was reported. The derailment occurred on a curve of 1 deg. 43 min. Two rails were found broken but they were beyond the point of derailment and there is no evidence that the derailment was caused by a broken rail.

The Louisville & Nashville has begun a suit in the Federal court in Florida, to test the validity of the law of that state, passed at the last session of the legislature, requiring all locomotives to be equipped with headlights of 15,000 candle power. The road claims that this law infringes the authority of the federal government, which has exclusive jurisdiction over locomotives used in interstate commerce. It is also set forth that such brilliant lights would introduce an element of danger, as they would obscure signal lights; moreover, the road would be put to an initial expense of \$15,000 in the state of Florida, and the cost of maintenance of the lights would be \$300 per year per engine.

The New York Central is sending out a circular, to be posted in all its stations, which calls attention to the fact that about 400 persons are killed annually in the state of New York while trespassing on the railroad tracks. This is about four times the number killed at grade crossings. This notice is printed on a sheet about 8 in. x 10½ in., and is headed "DO NOT WALK ON THE TRACK." It contains the usual arguments and warnings against endangering one's life by unnecessary walking on the railroad right of way and is in type large enough to be read some little distance away. Agents are instructed to deliver a supply of the placards to the schools and also to manufacturers, shippers and others who might aid the railroad in bringing the trespassing class to their senses.

Attorney General McReynolds appeared before the Senate Committee on appropriations at Washington on Tuesday of this week to argue in favor of the retention of the Commerce Court. Voicing what are believed to be the views of President Wilson, as well as of the attorney general himself, Mr. McReynolds declared that the Commerce Court, instead of being abolished, should have its powers enlarged. But little change in the law would be necessary to make the court satisfactory to all reasonable critics. Mr. McReynolds intimated that action by Congress throwing the judges out of office, would be unconstitutional. Congress has as much right to refuse to appropriate salaries for other federal judges as to refuse to provide for the judges who are assigned to the Commerce Court.

The New York, New Haven & Hartford is building at South Boston a new fish wharf, 1,200 ft. long. This wharf is to provide for the extensive traffic in fish which is now done mainly at the old T Wharf, one of Boston's ancient landmarks. The New Haven road carries from three to 15 carloads of fish from Boston to New York every night, by freight (not express) and the train makes the trip of 234 miles in eight hours five minutes, delivering its freight at Harlem river at 1:50 a. m. Every day from 50 to 300 tons of fish leave the South Boston terminal on this train bound to New York fish dealers, and a great deal of it has to be put aboard in the last five or ten minutes. It is not until well on in the afternoon that the New York fish dealers can decide just how much fish to order. Frequently it is four o'clock when some of the orders are received in Boston, and they are for fish that in some cases is wanted for breakfast the next morning in a New York hotel.

The New Haven road reports that nearly \$50,000 worth of articles lost in the North Haven wreck have been recovered by the railroad's police department. The number of articles scattered and lost at the time of the accident ran up into the thousands, but only twenty articles or groups of articles are now alleged to be missing. Such was the nature of this accident that an unusual amount of personal belongings was strewn about. Many of these when recovered lacked means of identification. A force of special agents of the New Haven road, working in conjunction with the New Haven and Wallingford police, took charge of the work of collecting these articles immediately. Included in the thousands of articles brought together were over 400 pieces of jewelry, ranging in value all the way from \$1 to \$1,000. There were over thirty watches and fifty rings, besides brooches, pins and one pearl necklace. All articles which could

be identified at once were restored as soon as possible to the owners or their authorized representatives. A force of ten men in the special agent's department was busy for over two weeks on this matter.

Twelve Passengers Killed in France.

A press despatch from Nice, France, September 17, reports the wrecking of three electric cars, filled with passengers, by a derailment on a bridge near the village of Villeneuve-Loubet, the cars falling 40 ft. to a ravine below. Besides the 12 killed there were 30 or more injured.

A Correction.

Through an error, the paper on Some Freight Car Troubles, abstracted in the *Railway Age Gazette*, September 19, page 499, was credited to the Western Railway Club instead of the Central Railway Club.

Fifty Persons Killed in Mexican Train Wreck.

A press despatch from Laredo, Tex., reports that on Friday, September 19, rebels wrecked a passenger train with dynamite at a point 60 miles south of Saltillo, Mex., causing the death of 50 persons, of whom 40 were Federal soldiers and 10 second class passengers. The surviving passengers were robbed.

Airship Flight from Europe to Africa.

Roland G. Garros, the French aviator, on Tuesday last, flew across the Mediterranean Sea from Saint Raphael, near Marseilles, France, to Bizerta, near Tunis, making the distance of 558 miles in seven hours 53 minutes. This is at the rate of about 70 miles an hour. Garros refused the offer of the French navy to furnish boats to safeguard his flight. For a considerable part of his journey he was not far from the coast of Corsica or Sardinia.

White Flags at Highway Crossings.

At South Norwalk, Conn., recently, an automobile was struck by a train of the New York, New Haven & Hartford, at a crossing, and three persons were killed. It is now reported that the New Haven Automobile Club has taken action on the fact, or assumption, that Mr. Miller, the driver of the automobile, thought the waving of a white flag by the crossing watchman was intended to indicate that the passage was clear. The club has voted to request the railroad company to change its flagging system.

Safety First on the Southern Pacific.

The principles of modern advertising are employed by the Southern Pacific in its "Safety First" campaign. Not only is every effort being made to see that operating rules are enforced, but bulletins, paychecks and other papers, go out bearing a striking escutcheon containing the words SAFETY FIRST. Buttons with a like design are worn by the men. "Display" signs are to be posted on bulletin boards wherever employees congregate. On all divisions, photographs and lantern slides are being prepared to illustrate faulty conditions. The Southern Pacific reports that it has not killed a passenger on any of its passenger trains for the last five years. President Wm. Sproule is devoting personal attention to this campaign. He says, "human life and limb are the dearest things we have, and this most certainly applies to employees as well as to patrons."

"Safety First" Clock.

A novel clock with the letters of the words "Safety First" utilized in place of the usual numerals, has been constructed by W. C. Egan, general claim agent of the Baltimore & Ohio. The clock is of the "grandfather" style, and is 6 ft. high; and across its face is the legend "Baltimore & Ohio," the initial "B" taking the place of the numeral 9, thereby completing the complement of 12 numerals. Above the dial is a semaphore arm, and twice each day the clock calls attention to the three essentials of safe railroading. At 10 a. m. and 4 p. m., the semaphore drops to the green, or caution position, a reminder to enginemen to proceed with caution. Next a whistle blows

twice, an acknowledgment that the signal is seen and will be heeded. After this a bell rings, being a reminder that no engine may move until its bell has been rung. And when the bell stops ringing a curtain drops from behind the clock displaying ten cardinal safety-first "don'ts."

Traffic at South Station, Boston.

The Grand Central terminal in New York City is the largest railway station in the country; but Boston's South station still claims the distinction of being the busiest terminal in America, if not in the world.

Statisticians of the New York, New Haven & Hartford report that in the year ending on the 30th of June, last, 16,007,582 more people passed through the South station than the Grand Central. The total number of passengers in and out of the South station was 38,411,507; total in or out of the Grand Central, 22,405,295; a daily average for the South station of 105,237 persons, and for the Grand Central terminal, 61,379. The figures by months are as follows:

	South Station	B. & A.	Grand Central.
July, 1912	2,284,509	780,218	1,799,846
August	2,315,690	892,066	1,837,554
September	2,280,484	815,284	1,871,229
October	2,590,245	917,630	1,936,891
November	2,426,490	847,229	1,820,461
December	2,424,052	851,708	1,865,416
January, 1913	2,401,067	841,949	1,861,352
February	2,130,615	754,470	1,618,526
March	2,425,051	853,869	1,902,549
April	2,397,717	850,869	1,896,327
May	2,451,496	866,208	2,023,402
June	2,219,983	793,160	1,971,742
Total	28,347,399	10,064,108	22,405,295

In the number of trains handled the South station also continues to be ahead, owing to the fact that the traffic is distributed over more lines. Eleven or more main tracks converge in the Boston terminal, whereas all of the trains to and from the New York station must be accommodated by four tracks.

The number of trains entering and leaving the South station in the 24 hour period on week days is 843; at the Grand Central it is 450. In the rush hour at the South station 91 trains leave in 60 minutes.

In the year under review, 226,391 more people departed from the Grand Central terminal than arrived there, and there was an increase in the total number using the station of 842,674 over the previous year.

The new Grand Central terminal has hardly begun to do the business for which it was designed; while 62,000 people use it daily at the present time, the station when completed will have a capacity to handle 70,000 people in one hour. Twenty-one tracks have still to be completed and put in use.

The travel in and out of the North station of the Boston & Maine at Boston for the last fiscal year was 29,510,875.

Admirals and Locomotive Runners.

The traveling public trusts that the locomotive engineers and the New Haven road will have no permanent differences concerning rules and discipline. On many points the public may not be able to pass judgment, owing to lack of expert knowledge, but it will strike most people that the engineers take an untenable position in holding that all engineers who have had a certain amount of experience are equally competent for all kinds of work. There are differences among individuals. If the road is charged with the transportation of the president of the United States, for example, it should be the right of the general manager to place in the locomotive an engineer reputed to be strong in the qualities of prudence. All rear-admirals in the navy have the same rank and pay; all are presumed to be competent to command a squadron or a fleet. But how absurd it would be to forbid the president of the United States to pick for a particular naval service the one of those rear-admirals believed to be most likely to insure its success.—*Springfield Republican*.

A Simple Calculation.

We have spent \$100,000,000 in improvements in the past three years. This has practically given a low grade line from Chicago to the Atlantic seaboard, increasing the train loading capacity 50 per cent. in that period. There should be a horizontal in-

crease of 5 per cent. in freight rates. I have every confidence in the Interstate Commerce Commission, and believe that the railroad case will meet favorable consideration. The increase in the Baltimore & Ohio payroll, the results of agreements, arbitration, etc., is \$5,000,000 a year, which with increased taxes and other legislative enactments makes a total of \$10,000,000 a year additional which the company is obliged to expend before any part of the profits can be applied to interest charges.—*Daniel Willard, President, B. & O.*

Prospects in Oklahoma.

Since statehood and the adoption of the constitution, railroad building in Oklahoma has been a myth; and practically the only construction was the completion of the Wichita Falls & Northwestern, which had been begun about a year before Oklahoma became a state. Since the railroad section of the constitution was amended on August 5 of this year, through a referendum vote, railroad talk in the state has been revived and there are evidences that development will come soon and certain.

Immediately after the result of the election was announced it became known that the Missouri, Kansas & Texas had taken over the Wichita Falls & Northwestern, such transaction being impossible under the constitution as it was formerly. Then came the announcement that the Santa Fe was negotiating with the Fort Smith & Western, and finally that the Santa Fe would take over the Oklahoma Central. The latter two propositions are considered important in railroad circles. If consummated these will make two splendid feeder lines for the Santa Fe.

The Fort Smith & Western crosses the Santa Fe at Guthrie, and then goes straight east to Fort Smith. This road about a year ago secured an option on the St. Louis, El Reno & Western, a short piece of road from Guthrie to El Reno that never paid as an individual line. It is understood that the objective point of the Santa Fe is Cairo, Ill., and by acquiring the Fort Smith & Western a big step in this direction will have been taken. The Fort Smith & Western was built in 1901 by H. C. Frick and a party of Pennsylvania capitalists for the purpose of developing Frick's coal fields in eastern Oklahoma. Coke was to be made out of the coal and shipped to Mexico. Frick and his syndicate were and are still heavily involved in producing coking coal in Pennsylvania, and the plan was to reduce the haul to Mexico by developing the fields in eastern Oklahoma. About the time the development work was begun Frick became associated with the steel trust and the Oklahoma project was dropped.

With the control of the Oklahoma Central by the Santa Fe other rich coal fields in the southern portion of the state may be reached. Also a rich agricultural section has been developed since the building of the road. This line also crosses the Santa Fe in McClain county. These deals are now possible because of the abolition of the constitutional provision prohibiting one road taking over another.

Within the past week talk concerning the construction of the M. O. & G. from Henryetta to this city has been revived. The line is owned by William Kenefick. Bonuses were secured a year ago from local business men for the purchase of terminal yards here, but held in abeyance pending realization on financial deals with French capitalists. It is said now that this money may be secured at any time and that work would then be commenced. Mr. Kenefick, who has been in France for several months, returned the past week, and accompanied by a number of French capitalists who came back with him, has been making trips over the proposed routes.

Since the election many new interurban lines have been projected, especially in the southern part of the state, and for the first time since the town was started, several years ago, people of Cheyenne this week heard the whistle of a locomotive. A branch of the Clinton & Oklahoma Western, known as the "Alfalfa Route," has been built into the town. It was completed this week.—*From a Correspondent at Oklahoma City.*

Connecticut Report on North Haven Collision.

The Public Utilities Commission of Connecticut has issued its report on the rear collision at North Haven, September 2. The commission assigns six specific causes, as follows: Lack of adequate signal system; bunching of six passenger trains in a section of 10 miles; reckless running on the part of Engineman

Wands; failure of Flagman Murray to go back a sufficient distance to protect his train; indifference of Conductor Adams, and Engineman Miller's reckless running in a fog.

Pending the completion of the new signals on the New Haven-Springfield section of the road the commission recommends that fixed boards be set up 2,500 ft. in the rear of each automatic signal except those which have distant indications. The report says that there is an apparent lack of friendly co-operation between the directing and operating forces of the railroad. Many recommendations are made, including the rigid enforcement of rules for flagging.

Which Is the Trust?

Frank J. Warne testifying before the Board of Arbitration, alleges that fifty-two railroads in interest are controlled by eighteen men. These men may or may not control the railroads. But there can be no question of the control of the railroad labor. These fifty-two railroads cannot run without labor. Their labor is absolutely controlled, and independently of the alleged railroad trust, by four men. The eighteen alleged monopolists cannot hold up public business to secure their ends. The four men possess exactly that power.

Here is the list and let an honest public say which set of tyrants it prefers:

CAPITAL.

George F. Baker,
William C. Brown,
J. P. Morgan,
William Rockefeller,
William H. Newman,
Samuel Rea,
James Stillman,
W. K. Vanderbilt, Jr.,
Oscar Murray,
Charles S. Mellen,
L. C. Ledyard,
William Skinner,
L. F. Loree,
John P. Green,
N. B. Ream,
Joseph Wood,
Chauncey Depew,
W. K. Vanderbilt.

LABOR.

Warren S. Stone,
(Engineers,)
W. S. Carter,
(Firemen,)
W. G. Lee,
(Trainmen,)
A. B. Garretson,
(Conductors.)

Accepting, for the sake of argument, the far-fetched charge of a monopoly of railroad control against the gentlemen named, what is the danger of it compared to the irresponsible autocracy of the four men named in the parallel column?—*Wall Street Journal.*

Electrification of Pennsylvania Tracks at Philadelphia.

The president of the Pennsylvania Railroad Company announces that the electrification of suburban passenger service on the New York division from Broad Street station, Philadelphia, to Chestnut Hill, 12 miles, has been authorized. It is expected that the work will be completed by the fall of 1914, and will involve an expenditure, including multiple unit equipment, of \$1,250,000. Until traffic between Allen Lane and Fort Hill on the Fort Washington branch warrants its electrification, it is intended to continue the steam service between those points.

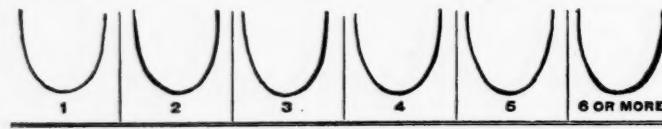
The company is endeavoring to meet as rapidly as practicable the problem of the congestion at Broad Street station. Without waiting for the enlargement of the station, it has been determined that the electrification of the Chestnut Hill branch, in connection with the electrification of the main line to Paoli, offers the most prompt and effective plan, particularly as it will be four or five years before the city subway can be built under Broad street and rapid transit operated as far as North Philadelphia station. Other steps already taken in this general plan of improvement are: First, the electrification of the main line to Paoli, 20 miles. Second, the acquisition of property for widening Broad Street station, and the enlargement of the concourse within the station. Third, construction of eight tracks and high level island platforms at North Philadelphia. Fourth, new passenger facilities and track connection at North Philadelphia for the Chestnut Hill branch, and fifth, a new and enlarged masonry arch bridge and additional tracks over the Schuylkill river at Girard avenue (main line of the New York division).

The foregoing improvements are now under way or in large measure completed. Pending the widening of Broad Street sta-

tion, which is dependent upon negotiations with the city, and the further development of the company's final terminal plans, it is essential to obtain as quickly as possible greater train capacity in the present station. There are now about 85 Paoli steam trains each day in and out of Broad Street station, and 66 trains to and from the Chestnut Hill Branch, all of which will be operated by electricity, thus affording immediate relief.

Prevention of Fires on the Western Pacific.

C. M. Levey, general manager of the Western Pacific, has furnished locomotive enginemen with cards, to be thrown off for the purpose of notifying section men of the need of going to a fire, which require no marking. On the edge of the card there are six half perforated notches, numbered from one to six; and the tearing out of the perforated strip by a push of the finger against, for example, the figure 4, indicates that the fire is four miles to the rear of the point where the card is thrown off.



LOCATION OF FIRE IN MILES TO THE REAR OF POINT WHERE CARD IS THROWN OFF IS INDICATED BY NUMBERS CHECKED ABOVE.

Enginemen are instructed to use these cards in case of all grass fires, whether on the right of way or on adjacent land. Men are to be sent at once to the fire, and the section master and the road master are directed to make prompt report to the superintendent, who will make any necessary investigation and then send the card, with his report, to the claim agent.

International Refrigeration Exposition.

In connection with the International Refrigeration Congress, held in Chicago last week, an exposition of machinery, materials and processes used in refrigeration, was held at the International Amphitheater at the Union Stock Yards. The exhibits opened on September 17, and will remain open until October 1. The position includes an exhibit of foods and perishable products by the United States Department of Agriculture shown in a 150 ft. glass wall refrigerator. Among the exhibits of interest to railways were the following:

American Rolling Mill Company, Middletown, Ohio.—American Ingots iron products. Represented by G. L. Ahlbrandt and G. L. Sheets.

Barrett Manufacturing Company, New York, N. Y.—Anhydrous ammonia cylinders and aqua ammonia drums; bottles of sulphate ammonia. Represented by J. P. Reilly, G. H. Thomson, Nicholas Wolf, Sr., and R. V. Irwin.

Crane Company, Chicago, Ill.—Valves, fittings and steam traps sectionally cut, pipe machine. Represented by C. A. Spencer, J. A. Nimwegen and F. D. Fenn.

Garlock Packing Company, Palmyra, N. Y.—Fibrous ammonia and other packings in spiral form, sheet packing, hydraulic and flax packings, metal packing, gaskets. Represented by H. F. Rall, C. C. Humberstone and Stanley McDole.

Gold Car Heating and Lighting Company, New York, N. Y.—Car equipped with heat storage and lighting system; sectional parts of car heater. Represented by W. H. Stocks and A. D. Stover.

Goldschmidt Thermit Company, New York, N. Y.—Pipe welding equipment; samples and pictures of welded material; thermits; demonstration of pipe welding. Represented by Henry S. Mann and Alfred Beaulieu.

Graver, Wm., Tank Works, Chicago, Ill.—50 ton Bartlett-Graver water softener and purifier in operation; photographs of brine tanks, steel stacks, ice tanks and steel plate work. Represented by W. F. Graver, K. W. Bartlett and C. Dahlquist.

Johns-Manville, H. W., Company, New York, N. Y.—Sheet and granulated cork; pipe and boiler covering; membrane waterproofing; mastic flooring; roofing; ammonia, steam and water packings; boiler preservative; asbestos and magnesia products; insulating and building papers; electrical supplies. Represented by C. D. Havenstrite.

Kennicott Company, The, Chicago, Ill.—Kennicott-Jewell pressure filter; water weigher; water softener. Represented by F. S. Dunham, W. D. Hawkins, T. G. Windes, Jr., and H. C. Ager.

Lehon Roofing Company, Chicago, Ill.—Roofing. Represented by Thomas Lehon.

Moore Patent Car Company, St. Paul, Minn.—Ventilator-heater-refrigerator car. Represented by C. A. Moore, G. F. Thomas and E. E. Squier.

National Tube Company, Pittsburgh, Pa.—Samples butt and lap welded ammonia pipe; "Spellerizing" process; sample pieces of skelp; threading dies, old and modern types; stand of "National" pipe. Represented by L. F. Hamilton, B. F. Bart and H. W. Weber.

Otto Gas Engine Works, Philadelphia, Pa.—Gas and gasoline engines.

Pacific Fruit Express, San Francisco, Cal.—Standard ventilated refrigerator car.

Solvay Process Company, Syracuse, N. Y.—75 per cent. calcium chloride; demonstration of uses of calcium chloride. Represented by Fred S. Lightall, Claude Cole and H. W. Jordan.

Taylor Instrument Company, Rochester, N. Y.—Temperature indicating, controlling and recording instruments; hydrometers. Represented by H. W. Maurer, Fred K. Taylor and J. A. Sutherland.

Union Fibre Company, Winona, Minn.—Standard refrigerator car insulated with Linofelt; samples of Linofelt, Fibrofelt, Lith and Union cork board. Represented by E. G. Boynton, J. W. Booth, A. S. More, F. C. Landon, J. J. Brown and H. W. Leeds.

Union Insulating Company, Chicago, Ill.—Pure cork boards; composition cork boards; waterproof lith boards; rock cork boards, Fibrofelt sheets. Represented by S. E. McPartlin, E. S. Main, J. H. Bracken, C. F. Rogers and N. B. Webster.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.—Motors and generators. Represented by W. H. Patterson and A. L. Hampton.

White Enamel Refrigerator Company, St. Paul, Minn.—Full size section of refrigerator car showing Bohn all steel collapsible bulkheads, hatch ventilators and plugs; samples Flaxlinum car insulation. Represented by Gebhard Bohn, G. C. Bohn and J. H. Burwell.

Railway Fire Protection Association.

The proposal to establish an association for the purpose indicated by the foregoing title, which was made public some months since has now so far taken shape that a meeting for organization is to be held at Hotel Sherman, Chicago, October 7 and 8 next. Eight instructive addresses are already on the program, as follows: Charles N. Rambo, superintendent of the Mutual Fire, Marine & Inland Insurance Company, on Railroad Fires; A. D. Brooks, Illinois Central, on "Spark Hazard"; B. W. Dunn, of the Bureau of Explosives, on Handling of Explosives; N. S. Dunlop, of the Canadian Pacific, on "Causes of Fire"; Anson Murphy, Alabama Great Southern, "Construction of Buildings"; B. S. Mace, Baltimore & Ohio, on "Fire Organization," and P. Hevener, Rock Island, on "How a Locomotive May be Used to Extinguish a Fire."

W. H. Merrill, manager of the Underwriters' Laboratories, Chicago, will make some tests for the benefit of the members of the association, plans having been made for a visit to the laboratories Tuesday afternoon.

The secretary of the Committee on Organization, is C. B. Edwards, fire insurance agent of the Mobile & Ohio, Mobile, Ala. Most of the members of the committee come from railroads in the southern states, but they desire to enlist the interest of all railroads; and, indeed, they have already received such assurance that they feel confident of success.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May, 1914.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass. Convention, May 19, 1914, St. Louis.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York. Annual meeting, October 14-15, Philadelphia, Pa.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Next convention, April 21, Houston, Tex.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Next convention, October 13-17, Atlantic City, N. J.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—H. G. McConaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 19, 1913, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichy, C. & N. W., Chicago. Convention, October 21-24, 1913, Montreal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 17-20, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wenninger, 11 Broadway, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, 1914, St. Paul, Minn.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Annual convention, October 18-24, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 20-23, New Orleans, La.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 9-10, Galveston, Tex.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y. Annual meeting, October 8, Philadelphia, Pa.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, May 20-22, Galveston, Tex.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual convention, May 18-22, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Next convention, November 18-20, Louisville, Ky.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NATIONAL RAILWAY APPLIANCE ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria; 2d Thursday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala. Next meeting, October 7, Chicago.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, October 14, Nashville, Tenn.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W. Sterling, Ill.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala. Annual meeting, October 16, 1913, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Puffalo, N. Y. Next meeting, Chicago.

UTAH SOCIETY OF ENGINEERS.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The State of South Dakota has complained before the Interstate Commerce Commission, of excessive rates for the transportation of coal from ports on Lakes Michigan and Superior to places in South Dakota.

A new route for through freight traffic will be opened on October 1, between eastern points and points in Arizona and California, via the El Paso & Southwestern system from Tucumcari, N. M., to Tucson, Ariz., in connection with the Rock Island lines on the east, and Southern Pacific on the west.

Mr. Prouty, of the Interstate Commerce Commission, held a hearing at Boston on Tuesday of this week on the application of the Boston & Maine for authority to make a general increase of 10 per cent. in its freight rates. Representatives of the Public Service Commissions of Maine, New Hampshire, Vermont and Massachusetts sat with Mr. Prouty.

The Lehigh Valley has opened a new freight pier at Jersey City, alongside its other piers near the Central of New Jersey passenger station. The new pier is 600 ft. long and replaces one which was destroyed by fire four years ago. This road has ordered for its New York harbor service a large tug, a car float to carry 23 cars, five lighters and five refrigerator barges.

J. C. Lincoln, traffic manager of the Merchants' Association, of New York City, has issued a statement showing in considerable detail the advantages accruing to New York shippers by reason of recent decisions of the Interstate Commerce Commission, making more favorable rates for the transportation of freight to places beyond the Mississippi river and to Duluth.

The monthly bulletin of the traffic department of the Chicago & North Western calls attention to the necessity for greater care on the part of agents and baggagemen to cancel tickets for baggage service by a baggage punch or special stamp when checking baggage on tickets. The bulletin states that in some cases passengers purchase tickets merely to get their baggage carried to destination, and travel themselves by automobile or electric line, and then send their railroad tickets in for redemption. It is unlawful for the company to redeem tickets without proper charge for service rendered.

The action of the railroads centering in Baltimore, Md., in abolishing free store-door delivery of freight, has been approved by the Interstate Commerce Commission; that is to say, the commission has refused to suspend the new tariffs, and they went into effect September 1, both at Baltimore and at Washington. It will be recalled that the subject of store-door delivery was considered at length by the commission in reporting on the practice at Washington some months ago, and that the commission decided that it must not be discontinued at Washington as long as it was continued at Baltimore. The merchants of Washington have now made formal complaint against the roads, declaring that rates from all directions are too high and asking that the carriers be ordered to make reparation on freight bills paid since the day when store-door delivery was abolished.

Cars Worth More Than Demurrage Money.

M. W. Rotchford, manager of the Illinois & Iowa Demurrage Bureau, has issued a strong circular designed to promote car efficiency. Records of 45 principal lines within the territory of the bureau for the first seven months of 1913 show an increase in cars handled of 12.2 per cent. over the corresponding period of 1912, while the increase in cars earning demurrage is 61.15 per cent. The total demurrage earned this year, \$273,191, represents an increase of 68.16 per cent. This large increase in demurrage earnings and collections, the circular says, compared with the increase in cars handled "at first sight might be taken by some to indicate a favorable showing, but such is not the case when car efficiency is taken into consideration. The question that naturally arises is—then what does it indicate and what is the remedy? It means: 1, that cars are being delayed in loading and unloading to a greater extent; 2, that 24,673 more cars were withheld from transportation service by some patrons at the same time other patrons were wanting cars; 3,

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JULY, 1913.

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance of way and structures, equipment			Operating expenses			Net operating revenue (or deficit).	Outside operations, net.	Operating income (or loss).	Taxes.	Operating income (or loss) last year.	
		Freight.	Passenger.	Total.	Traffic.	Transportation.	General.	Total.	Trans-	Operating expenses (or deficit).						
Ann Arbor	292	\$106,260	\$58,821	\$177,823	\$25,736	\$22,749	\$4,818	\$60,664	\$6,768	\$120,185	\$43,251	\$13,930	\$13,930	\$791		
Arizona & New Mexico	109	66,403	8,165	78,114	5,439	5,669	780	14,729	2,911	42,528	35,586	3,400	3,400	32,186		
Arizona Eastern	367	181,276	37,540	229,751	31,682	21,104	6,718	10,693	1,380,024	91,732	11,396	80,238	80,238	15,231		
Atchison, Topeka & Santa Fe	8,93	4,882,519	2,243,591	7,631,766	1,241,732	170,190	2,136,591	170,190	5,136,401	1,241,732	2,553,401	2,178,667	2,178,667	150,943		
Atlanta & West Point	44,832	97,345	21,430	19,059	21,430	5,045	32,817	4,529	82,920	14,425	145	6,484	6,484	4,606		
Atlanta, Birmingham & Atlantic	645	177,302	64,725	261,966	41,944	49,790	14,639	105,864	10,798	223,035	38,931	14,336	14,336	24,595		
Atlantic & St. Lawrence	167	70,550	32,633	111,773	39,049	19,015	3,763	59,072	11,432	10,157	—	—	—	—	26,731	
Atlantic Coast Line	4,617	1,588,101	68,400	2,457,152	416,281	457,301	47,138	987,465	81,139	1,989,824	267,328	132,000	132,000	132,000	10,738	
Baltimore & Ohio System	4,456	181,276	37,540	229,751	28,830	1,258,438	1,332,749	193,473	3,165,456	6,146,000	2,692,809	71,411	266,681	2,354,738	63,262	
Baltimore & Ohio Chicago Terminal	77	1,518,746	901	155,064	1,276,338	4,276,434	153,124	28,887	1,266	6,263	109,051	44,051	1,013	16,052	2,085	
Belt Ry. Co. of Chicago	21	1,034,107	46,620	1,022,384	21,716	258,599	34,727	528	98,632	12,424	61,548	—	9,770	86,286	3,153	
Belt Ry. & Lake Erie	204	70,001	1,208	118,791	16,440	146,661	14,075	12,623	49,591	10,623	35,980	—	38,800	562,586	6,190	
Birmingham Southern	243	2,341,530	1,615,387	3,968,917	427,634	566,637	660,803	34,567	1,844,985	112,822	3,219,874	1,056,560	1,056,560	45,269	20,641	
Buffalo & Susquehanna R. R.	253	139,766	9,391	155,064	1,276,338	4,276,434	153,124	22,428	1,266	50,229	109,051	44,051	2,200	41,851	2,354,738	
Buffalo & Susquehanna Ry.	91	41,052	125,566	56,811	9,870	27,422	4,555	21,304	2,497	61,548	—	122	1,600	6,459	3,489	
Buffalo, Rochester & Pittsburgh	576	906,082	123,774	1,022,384	174,546	126,651	12,424	33,558	20,945	746,404	35,980	—	18,000	307,972	40,230	
Butte, Anaconda & Pacific	90	14,081	14,081	23,426	22,428	13,007	19,823	6,769	4,080	4,303	79,299	42,286	2,250	40,036	26,388	
Carolina, Clinchfield & Ohio Ry. of S. C.	18	195,697	12,661	223,061	14,147	23,426	6,485	39,214	8,548	91,820	13,241	9,200	121,951	23,764		
Central of Georgia	912	581,530	342,976	1,005,290	155,369	240,277	37,110	372,519	38,496	843,771	161,519	7,380	50,370	119,529	—	
Central of New Jersey	676	1,690,720	628,704	2,318,438	261,979	374,804	30,708	720,492	45,666	1,433,647	964,751	86,177	94,088	956,840	—	
Central New England	277	228,065	35,938	276,704	42,493	283,304	22,025	6,932	4,080	156,581	120,123	330	10,500	109,953	34,502	
Charleston & Western Carolina	331	107,983	32,382	146,460	29,738	31,077	5,722	172,349	4,320	326,621	43,311	882	15,500	19,762	13,901	
Chesapeake & Ohio Lines	2,341	2,174,701	550,996	2,861,884	375,796	532,793	53,456	945,158	69,995	1,977,198	884,686	—	9,284	118,529	—	
Chicago & Alton	1,032	842,899	398,804	1,328,269	172,055	245,646	38,503	481,133	34,976	1,975,313	352,956	163,079	131,166	121,166	4,366	
Chicago & Eastern Illinois	1,275	992,490	268,742	1,367,472	246,688	283,304	20,256	471,48	37,692	1,064,397	303,375	24,372	25,500	25,500	—	
Chicago, Burlington & Quincy	912	4,956,629	2,126,229	7,754,559	1,114,005	1,421,568	131,397	2,387,445	50,003	5,145,188	2,609,371	18,205	2,475	2,475	105,907	
Chicago Great Western	1,496	803,713	302,347	1,195,929	186,027	195,652	43,663	413,102	36,383	874,827	321,102	892	12,614	12,614	292,514	
Chicago, Indiana & Southern	359	2,101,035	30,640	2,320,994	92,627	87,544	9,081	68,666	11,495	11,023	273,111	1,333	15,283	33,933	—	
Chicago, Junction & Quincy	617	382,161	150,549	581,890	171,320	17,949	6,801	18,301	1,060	204,288	16,023	418,811	163,079	31,166	26,251	
Chicago, Milwaukee & St. Paul	112	1,277,244	1,881,371	2,741	1,125,518	1,125,518	1,125,518	1,125,518	1,125,518	3,743	3,743	1,13,821	2,562	54,847	54,847	
Chicago, Peoria & St. Louis	9,690	255,906	32,640	308,283	133,633	22,104	6,635	160,894	2,655,323	138,750	52,255	2,525	31,510	31,510	—	
Chicago, Rock Island & Gulf	477	156,022	58,633	234,023	37,717	286,386	27,288	91,273	8,013	188,897	45,126	—	1,611	7,935	35,580	
Chicago, St. Paul, Minneapolis & Omaha	1,747	828,784	481,457	1,427,108	92,627	143,442	14,642	519,726	32,461	1,050,433	370,675	3,096	3,096	31,704	31,704	
Cincinnati, Hamilton & Dayton	1,015	620,707	157,876	828,293	143,442	143,442	14,642	409,909	18,353	1,383,992	373,995	3,212	3,212	113,888	113,888	
Cleveland, Cincinnati, Chic. & St. Louis	245	815,153	124,697	930,283	125,248	38,751	2,709	52,075	3,482	122,265	9,299	14,900	5,500	14,900	93,175	
Colorado, Delaware, Lackawanna & Western	1,131	19,149	30,046	135,953	41,142	48,233	2,585	78,709	5,696	176,365	21,542	—	2,256	30,675	34,397	
Denver & Rio Grande	2,885	2,461,232	854,281	3,549,593	564,965	553,21	74,737	1,024,082	65,177	2,287,172	1,262,21	30,561	165,000	1,277,739	46,394	
Detroit, Grand Haven & Milwaukee	191	113,000	103,342	207,212	30,339	8,152	5,765	586,626	54,083	1,580,365	52,255	6,233	8,202,067	87,800	55,155	
Detroit River Tunnel	2	1,026,050	3,105	1,101,274	174,125	196,120	4,938	74,217	1,288,519	71,571	2,795,638	92,992	144	3,600	3,600	12,062
Detroit, Toledo & Ironton	441	108,526	14,905	130,430	17,143	9,566	2,585	172,808	19,533	10,352	427,775	839,692	6,123	73,594	72,221	
Duluth, Missabe & Northern	356	1,224,876	32,838	1,267,467	120,310	2,014	1,267,467	1,267,467	1,267,467	11,533	1,267,467	1,267,467	1,267,467	1,267,467	1,267,467	
Duluth, South Shore & Atlantic	627	172,691	110,607	311,927	36,522	36,522	36,522	85,573	11,149	84,866	21,737	2,002	18,000	55,739	11,252	
El Paso & Southwestern	982	57,066,633	103,342	701,971	122,073	104,670	15,770	199,099	27,451	469,063	235,908	1,637	35,000	186,271	78,006	
Elgin, Joliet & Eastern	801	1,026,050	65,041	203,107	25,857	40,974	7,717	1,205,177	87,597	9,104	171,250	307,630	31,857	31,857	166,300	
Florence & Cripple Creek	76	244,030	224,566	417,103	62,598	87,937	10,924	215,908	15,412	397,865	99,729	880	23,641	16,003		
Fort Worth & Denver City	454	1,338	539,332	276,234	869,03	129,845	192,552	118,142	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	
Galveston, Harrisburg & San Antonio	1,338	134,985	77,313	229,057	37,803	40,717	27,370	428,034	31,755	882,747	18,279	4,019,336	3,496,391	408,245		
Georgia, Southern & Florida	395	113,034	65,041	203,107	25,857	40,974	7,717	1,205,177	9,314	210,167	13,926	244,692	41,000	42,062	54,087	
Grand Rapids & Indiana	578	244,030	224,566	417,103	62,598	87,937	10,924	215,908	15,412	397,865	99,729	880	23,641	16,003		
Grand Trunk Western	347	7,750	5,453,431	1,589,055	7,535,227	1,262,924	771,997	118,142	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	
Great Northern	1,556	352	539,661	303,935	84,985	211,534	187,594	118,142	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	1,750,722	
Gulf, Colorado & Southern	1,160	506,490	203,062	724,147	51,202	124,522	21,737	204,443	20,443	287,655	18,279	4,019,336				

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JULY, 1913—(CONTINUED).

Name of road.	Average mileage operated during period.	Operating revenues—			Maintenance of way and structures.			Operating expenses—			Net operating revenue (or deficit). Total.	Outside operations, net.	Operating income comp. with last year.
		Freight.	Pasenger.	Total, inc. misc.	Traffic.	Trans- portation.	General.	Taxes.	Net.	Operating income (or deficit). Total.			
Lake Erie & Western.	\$382,993	\$83,453	\$49,538	\$94,841	\$12,240	\$194,079	\$416,893	\$78,745	\$22,139	\$56,606	-\$16,189		
Lake Shore & Michigan Southern.	1,872	3,995,664	1,316,308	4,960,887	751,726	824,789	90,881	1,597,398	93,586	1,602,447	1,472,198	112,064	
Long Island.	255	110,959	1,085,996	1,507,267	158,401	153,844	26,560	484,678	817,137	650,130	626,946	24,105	
Louisiana & Arkansas.	208	102,252	64,280	139,800	20,414	22,793	2,393	5,091	33,911	51,429	47,263	4,876	
Louisiana & Western.					20,223	47,503	7,171	6,547	53,515	41,066	34,854	25,484	
Louisville & Nashville & St. Louis.	4,923	3,448,464	1,190,523	4,925,194	867,783	998,279	113,726	1,681,168	101,702	3,762,658	1,162,536	-225	
Maine Central.	200	66,468	36,077	108,720	84,816	15,982	4,597	35,091	3,219	82,805	25,915	-6	
Michigan Central.	1,207	551,767	383,203	998,782	173,600	143,472	13,913	385,337	29,879	746,201	252,581	-4,239	
Midland Valley.	373	1,819	1,742,374	946,833	2,966,087	471,134	51,134	1,207,997	1,207,997	2,999,280	1,063,997	-27,38	
Minneapolis & St. Paul & S. S. Marie.	1,586	520,156	174,999	742,786	92,063	101,396	16,784	813,186	51,981	228,853	20,476		
Minneapolis, St. Paul & S. S. Marie.	3,976	1,747,221	696,794	2,634,706	423,131	388,280	52,650	86,042	1,923,664	732,405	-9,660		
Missouri, Kansas & Texas System.	3,817	1,610,746	865,394	2,656,009	483,780	381,179	61,020	6,292	84,571	13,124	454	6,000	
Missouri, Oklahoma & Gulf.	332	71,513	23,762	97,897	17,328	14,328	5,654	1,974	5,171	7,907	171	171	
Missouri, Okla. & Gulf Ry. Co. of Texas	19	7,370	8,006	15,521	8,006	8,006	4,086	5,355	3,159	44,859	171	171	
Missouri Pacific.	3,920	1,794,175	474,514	2,466,402	328,204	437,074	64,070	955,649	64,070	612,031	-3,930	93,390	514,711
Monongahela Connecting & St. Louis.	1,231	66,357	276,338	1,027,198	172,315	224,522	41,305	42,912	27,797	128,254	-1,966	36,000	140,020
New Orleans, Texas & Mexico.	286	96,229	18,968	122,982	24,902	8,571	2,534	48,195	39,078	867,893	159,305	-1,980	
New York, Chicago & St. Louis.	565	166,530	952,877	1,634,622	175,233	52,408	41,300	1,209,972	128,491	824,623	3,796	32,284	196,615
New York, New Haven & Hartford.	2,113	271,880	2,565,123	5,778,278	762,263	760,980	35,954	2,186,972	1,295,031	1,177,531	1,160,561	-14,672	
New York, Philadelphia & Norfolk.	1,132	338,893	45,185	41,256,226	33,199	75,804	5,576	1,182,911	2,558,049	1,287,677	1,235,000	-19,705	
Norfolk & Western.	2,035	3,264,758	44,529	3,845,726	481,979	54,852	1,182,911	523,876	30,862	97,226	1,113	40,966	-31,251
Northern Central.	472	807,750	231,395	1,111,714	154,441	248,056	16,991	1,793,978	83,649	3,995,518	3,796	337,610	1,782,937
Northern Pacific.	6,313	929,060	1,740,716	2,672,500	1,272,298	732,916	112,625	1,209,972	125,649	2,076,982	43,565	-47,620	
Northern Pacific.	401	1,133,913	266,102	423,537	42,537	34,216	5,413	1,197,505	1,205,624	1,203,959	15,100	188,859	317,706
Oregon Short Line.	1,981	1,196,565	517,116	1,822,322	286,562	239,986	54,839	433,133	49,794	1,066,514	570	133,420	621,818
Pecos & Northern Texas.	482	1,29,214	43,002	183,590	24,140	43,594	3,594	54,627	7,387	50,283	53,702	186,243	-132,14
Pennsylvania Co.	1,751	4,697,106	955,565	6,213,635	864,146	1,002,394	91,551	2,167,374	107,643	4,293,108	1,920,527	-11,385	-305,304
Pennsylvania Railroad.	4,032	11,468,263	3,458,896	15,937,780	2,005,782	3,076,923	230,735	5,587,639	365,343	1,266,422	4,671,358	-176,006	590,093
Peoria & Eastern.	352	769,747	61,094	263,737	52,014	76,924	4,712	1,16,698	5,891	219,578	203,959	-3	143,023
Pere Marquette.	2,325	795,921	44,139	1,365,923	310,812	34,254	81,154	1,205,624	1,205,624	144,122	90,274	-288	1,610
Philadelphia, Baltimore & Washington.	713	96,1583	65,786	1,786,010	326,592	353,195	33,594	774,380	58,104	1,546,065	143,037	-4,146	49,788
St. Joseph & Grand Island.	319	129,702	33,606	175,158	33,027	65,974	10,619	63,793	6,506	142,051	49,992	-84	17,025
St. Louis & San Francisco.	4,742	2,424,247	1,011,603	3,693,530	507,248	551,805	76,000	1,152,770	91,658	2,379,481	1,314,049	113,594	1,200,455
St. Louis, Brownsville & Mexico.	518	97,230	12,092	180,473	46,714	43,240	1,235	63,466	51,046	1,436,370	2,994	-3	5,500
Richmond, Fredericksburg & Potomac.	88	134,208	71,135	234,396	24,947	26,207	3,061	81,154	6,753	1,205,624	1,205,624	-288	97,909
St. Louis, Merchants' Bridge Terminal.	9	458	215,240	110,720	128,107	126,849	22,702	10,619	128,986	28,550	255,101	14,336	10,244
St. Louis Southwestern.	906	465,740	128,107	634,131	175,614	208,316	22,023	4,901	63,793	15,187	286,517	14,336	10,244
Southern Kansas of Texas.	1,179	3,66,024	1,665,633	5,424,833	794,004	906,047	180,248	1,15,305	2,137	1,435,601	-2,655	207,657	1,225,289
Tennessee Central.	294	96,686	43,631	148,398	31,556	21,998	5,747	4,725	5,747	1,292,232	1,435,601	3,476	280,255
Terminal Railroad Ass'n of St. Louis.	34	1,20,250	10,170	123,917	41,596	46,355	57,469	855,070	79,247	1,810,717	1,435,601	4,245	75,491
Texas & New Orleans.	458	215,240	110,720	349,170	84,129	90,817	7,627	14,124	6,131	143,037	14,336	5,000	13,341
Texas & Pacific.	7,037	3,360,722	1,665,633	4,182,819	259,257	237,010	36,645	548,529	112,036	262,513	4,603	48,276	1,200,455
Toledo & Ohio Central.	443	488,337	60,575	586,886	122,325	96,287	7,705	1,11,174	10,166	447,657	139,229	-922	21,504
Union Pacific.	1,885	901,157	395,407	1,292,199	482,030	608,337	112,689	1,113,059	119,870	1,435,985	1,856,214	-2,928	168,087
Union Railroad of Baltimore.	3,611	2,870,406	1,008,165	4,292,199	151,124	10,656	1,303	5,796	2,582	1,30,337	1,30,782	3,476	124,936
Union Pacific.	248	62,561	44,753	114,299	24,946	22,233	2,592	47,330	371,539	28,045	232,524	4,245	34,887
Union Pacific.	341	340,916	38,517	403,985	42,233	59,889	15,074	139,367	8,346	264,599	104,574	-5,425	56,476
Ulster & Delaware.	129	60,886	78,182	145,941	14,694	14,818	3,067	51,783	87,350	58,591	14,336	14,336	-13,341
Vandalia.	3,611	2,870,406	1,008,165	4,292,199	151,124	10,656	1,303	5,796	2,582	1,30,337	1,30,782	3,476	124,936
Western Maryland.	910	653,340	224,185	980,883	139,880	188,462	28,033	371,539	28,045	232,524	4,245	34,887	30,316
Western Maryland & Southwestern.	2,515	1,80,636	71,766	2,73,871	22,776	22,776	8,178	47,330	371,539	28,045	232,524	4,245	34,887
Western Railway of Alabama.	133	50,264	45,658	104,413	23,107	24,732	5,798	51,428	104,574	104,574	104,574	104,574	-104,574
Washington Southern.	36	39,637	35,644	101,658	12,643	13,932	1,293	40,988	21,744	28,888	11,623	-152	3,520
West Jersey & Seashore.	356	173,867	622,843	835,686	113,354	106,112	16,882	274,538	13,207	24,663	311,623	-5,425	26,242
Western Maryland.	661	536,256	156,825	727,776	111,242	97,946	14,818	15,864	53,201	174,572	174,572	-174,572	-63,088
Western Railway of Alabama.	133	50,264	45,658	104,413	23,107	24,732	5,798	51,428	104,574	104,574	104,574	104,574	-104,574

that railroads' cost of operation was increased by reason of extra switching caused by excessive detention. The remedy is: 1, education of the patron to the fact that the railroad prefers the cars to the demurrage charge; 2, an additional incentive to patron to return cars more promptly to transportation service; 3, increase the demurrage rate to \$3 per day, which, according to experience in California lessens car detention.

"There is an erroneous impression abroad that the railroads are satisfied when they collect the demurrage due. While it is incumbent upon the railroads to collect demurrage in accordance with their tariff and upon patrons to pay, the railroad loses about \$2 per car per day when it collects a dollar demurrage, as the average daily earning is about \$3 per car."

STATE COMMISSIONS.

The Montana Railroad Commission has ordered a general investigation of freight rates from all distributing centers in the state, to be begun at a hearing on October 8.

The Oklahoma Corporation Commission held a hearing recently on a proposed order requiring railways to stop passenger trains at the nearest station to the state line to afford interstate travellers an opportunity to repurchase tickets, thereby taking advantage of the two-cent state fare instead of the higher interstate rates.

The railroad committee of the East St. Louis Commercial Club appeared before the Illinois Railroad and Warehouse Commission last week, asking an order requiring better train service between East St. Louis and Chicago. Many of the fast St. Louis-Chicago trains cross the Mississippi river over the Merchants' bridge, thereby avoiding East St. Louis.

COURT NEWS.

The Court of Common Pleas at Erie, Pa., has refused to order the New York, Chicago & St. Louis to reduce passenger fares in Pennsylvania to two cents a mile. Attorneys for the road showed in their arguments that Erie is the only important place on its line through the state with a few small towns to the east and west. It was shown that the road received only \$6,483 from these towns for the last year and that a two-cent fare would reduce this sum \$1,453. It was declared that trolley lines carry most of the local business.

Justice Lamar, of the Supreme Court of the United States, heard argument at Washington on Monday last on the application of the Louisville & Nashville for an order restraining the enforcement of the 2½ cent passenger fare order, which was recently issued by the State Railroad Commission of Alabama. The road offered to issue to each passenger with tickets, checks calling for a refund in case the suit to maintain a lower rate should fail; but its arguments proved fruitless and its application was denied. The road will now try to get the Federal court in Alabama to reconsider its decision.

PROPOSED SPANISH RAILWAY.—Proposals are requested for the concession and construction of a 280-mile railway from Torre del Mar to connect at Zurgena with the railway from Granada to Murcia, and to have branches from Guadal Feo to Granada, Lobras to Motril, and Tabernas to Almeria. The estimated cost is \$22,713,318. The rolling stock of this railway must comprise at least 36 locomotives; 24 first-class, 32 second-class, and 50 third-class passenger cars; 20 baggage cars; 150 box cars; and 250 other freight cars. The passenger cars are not to have side entrance doors. Plans are on file in the Ministerio de Fomento, Sección de Ferrocarriles, Madrid, Spain, where they may be seen, and to which proposals accompanied by the provisional security must be submitted before February 27, 1914. Francisco Javier Cervantes is the petitioner for this railway and owner of its project and if successful in bidding against the petitioner, the concessionaire must refund the cost of making the project, which is \$45,611, plus the expenses of government examination of same, and 5 per cent. annual interest on these amounts combined from the date on which the project was filed. Work must be begun within three months from the date the concession is awarded and must be finished within seven years from the same date.

Railway Officers.

Executive, Financial and Legal Officers.

E. Deschenes, Jr., has been appointed auditor of the Central Vermont, with office at St. Albans, Vt., succeeding W. G. Crabbe, deceased.

W. C. Everett has been appointed auditor of the Virginian Railway, with headquarters at Norfolk, Va., succeeding F. C. Uhlman, resigned to go to another company.

W. F. Bull, whose appointment as assistant secretary of the Southern Pacific Company, with headquarters at New York, has been announced in these columns, was born on February 10, 1874, at Newark, N. J. He began railway work in 1890, as a clerk on the Baltimore & Ohio, at Baltimore, Md., and in March, 1900, entered the service of the Southern Pacific as a clerk in the general office. He was later successively statistician in the vice-president's office, secretary of the pension department, chief clerk to the director of maintenance and operation, and at the time of his recent appointment as assistant secretary, was chief clerk to the chairman of the executive committee of the same road, with headquarters at New York.

Operating Officers.

William J. Melchior has been appointed assistant trainmaster of the Fargo division of the Northern Pacific, with headquarters at Dilworth, Minn.

William C. Francis has been appointed superintendent of dining service of the Illinois Central, with headquarters at Chicago, succeeding F. M. Dow, resigned.

G. W. Landon has been appointed an agent of the operating department of the Baltimore & Ohio Southwestern, with headquarters at North Bend, Ohio, succeeding H. A. Wedding.

C. C. Grimm has been appointed trainmaster of the Baltimore & Ohio at Newark, Ohio, in place of W. T. Eagan, resigned. C. W. Van Horn, trainmaster at Clarksburg, W. Va., has been transferred to Garrett, Ind., in a similar capacity. T. J. Rodgers has been appointed assistant trainmaster at Garrett.

J. J. Donnelly has been appointed trainmaster of the Gulf, Colorado & Santa Fe at Temple, Tex., succeeding E. E. Taylor, who has been transferred to Galveston, Tex., in a similar capacity in place of J. P. Cowley, who has been made trainmaster at Beaumont, Tex. W. M. Knowd has been appointed trainmaster at Temple.

D. B. Fleming, assistant superintendent of the New York Central & Hudson River at Albany, N. Y., has been appointed superintendent of the Buffalo division, with office at Buffalo, succeeding H. E. Brown, and F. S. Risley, trainmaster at Albany, has been appointed assistant superintendent of the Mohawk division, succeeding Mr. Fleming.

S. C. Wolfersberger, who has been appointed assistant superintendent of the Baltimore & Ohio, with headquarters at Somerset, Pa., was born at Broadford, Pa., and entered the service of the Baltimore & Ohio in June, 1882, as a warehouseman, later becoming yard clerk. In April, 1887, he was made locomotive fireman, and in March, 1892, was promoted to locomotive engineer, becoming road foreman of engines in October, 1901, of the same road. He was appointed trainmaster of the New Castle division in September, 1904, with headquarters at New Castle, Pa., later becoming supervisor of transportation of the Pittsburgh district, which position he held at the time of his recent appointment as assistant superintendent at Somerset, of the same road, as above noted.

Thomas W. McGaw, whose appointment as superintendent of the Savannah Terminal division of the Seaboard Air Line, with headquarters at Savannah, Ga., has been announced in these columns, was born on June 23, 1866, at Detroit, Mich., and was educated in the public schools of his native town. He began railway work in June, 1877, as a messenger boy on the Michigan Central. He was subsequently with the Wells Fargo Express consecutively as messenger, superintendent's clerk and agent, and with various western railroads as baggageman, brakeman, switchman and clerk, until 1890, when he went to the Union Stock

Yards at Chicago, as yardmaster, and later became manager of Swift & Company's railroad department. In 1897, he was appointed yardmaster of the Norfolk & Western at Lynchburg, Va., becoming general yardmaster at Norfolk in 1899. He went to the Seaboard Air Line as trainmaster in 1901, and two years later became assistant general yardmaster of the Illinois Central at New Orleans, La. From 1903 to 1905, he was trainmaster of the Illinois Central and the Yazoo & Mississippi Valley. He then became general yardmaster of the New York, Susquehanna & Western, remaining in that position until 1906, when he returned to the Seaboard Air Line as general yardmaster, and later was made trainmaster, which position he held at the time of his recent appointment as superintendent of the Savannah Terminal division of the same road as above noted.

Osmon L. Eaton, who has been appointed superintendent of the Baltimore & Ohio, with headquarters at Connellsville, Pa., as has already been announced in these columns, was born on June 28, 1863, at Pittsburgh, Pa. He began railway work in 1880, with the Allegheny Valley, now a part of the Pennsylvania Railroad, and from November 1, 1881, to April 1, 1908, was consecutively operator, agent, train despatcher, car distributor, chief train despatcher, and assistant trainmaster at Pittsburgh, Pa., on the Baltimore & Ohio. In April, 1908, he was appointed trainmaster of the Connellsville division of the same road, and on March 1, 1912, became assistant superintendent of that division, with headquarters at Somerset, Pa., which position he held at the time of his recent appointment as superintendent of the same road with headquarters at Connellsville, Pa., as above noted.

Traffic Officers.

A. J. Anderson has been appointed contracting freight agent of the Baltimore & Ohio at Chicago.

N. W. Secor has been appointed commercial agent of the Michigan Central at Toledo, Ohio, succeeding W. C. Thomas, transferred.

C. H. Jasper has been appointed district freight and passenger agent of the Southern Pacific at Fresno, Cal., succeeding J. F. Hixon, deceased.

F. B. Hillebrand has been appointed commercial agent of the Lehigh Valley, with office at Toledo, Ohio, succeeding H. T. Jenney, resigned.

Clarence P. Ware has been appointed soliciting freight agent of the Georgia Southern & Florida, with office at Cincinnati, Ohio, succeeding Chas. T. Dabney, resigned.

A. A. Robertson has been appointed general agent of the freight department of the Atchison, Topeka & Santa Fe at Cincinnati, Ohio, succeeding J. F. Thompson, transferred.

George W. Hamilton, chief clerk of the general freight department of the Union Pacific at Omaha, Neb., has been appointed assistant general freight agent at that place, to succeed Howard Bruner, who has been appointed chief clerk to B. L. Winchell, director of traffic, at Chicago.

Roy Terrell, assistant general freight and passenger agent of the Frisco lines in Louisiana and Texas, has been appointed general agent of the freight department of the New Orleans, Texas & Mexico lines, with headquarters at New Orleans, La., and Mark Anthony, has been appointed district passenger agent at that point. Mr. Anthony heretofore has been city passenger and ticket agent of the Frisco lines at New Orleans.

Alvin T. Steinel has been appointed general immigration agent of the Rock Island Lines, with headquarters at Chicago, succeeding C. B. Schmidt, who has been retired under the pension rules of the company. The agricultural and immigration departments have been consolidated and the title of commissioner of immigration, heretofore held by Mr. Schmidt, has been abolished, Mr. Steinel reporting to Prof. H. M. Cottrell, agricultural commissioner.

The following general agents will represent the Western Pacific, Denver & Rio Grande, Missouri Pacific and St. Louis, Iron Mountain & Southern at the points named: P. B. McAtee, Durango, Colo.; C. P. Ensign, Los Angeles, Cal.; J. Q. Patton, San Jose, Cal. The following are appointed general agents, passenger department, of the roads mentioned: T. F. Brosnahan, Fresno, Cal.; W. B. Townsend, Oakland, Cal.; J. C. Havely, Sacramento, Cal.; R. V. Crowder, San Francisco, Cal.; I. A. Benton, Salt Lake City, Utah; W. H. Cundry, Colorado Springs, Colo.

Engineering and Rolling Stock Officers.

B. D. King has been appointed roadmaster of the Lake Erie & Western Eastern division, with office at Lima, Ohio, succeeding J. R. Coulston, resigned.

H. R. Warnock has been appointed superintendent of motive power of the Western Maryland, with office at Hagerstown, Md., succeeding C. M. Tritsch, resigned.

P. H. Hamilton has been appointed terminal roadmaster of the St. Louis & San Francisco, with headquarters at Memphis, Tenn., succeeding A. R. Van Zant, assigned to other duties.

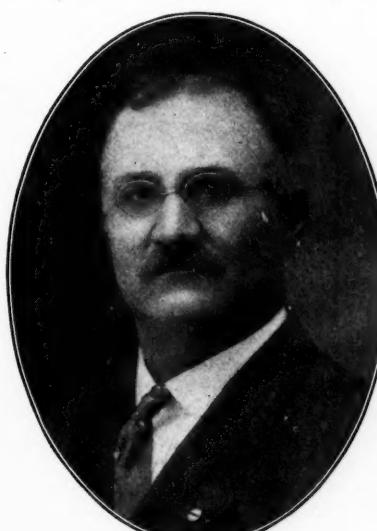
W. F. Beardsley, master mechanic of the Pennsylvania Lines West of Pittsburgh, at Crestline, Ohio, was retired on September 1, under the pension rule of the company.

The position of master mechanic of the Missouri, Kansas & Texas, at Sedalia, Mo., heretofore held by G. P. Letts, is abolished and the duties of that office will be assumed by W. Rothmeyer, road foreman of engines at that place.

W. J. Fraudendiener, formerly superintendent of shops of the Lake Shore & Michigan Southern at Elkhart, Ind., has been appointed general inspector, locomotive department, in the office of superintendent of motive power, of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind.

G. M. Crownover, whose appointment as superintendent of motive power of the Chicago Great Western, with headquarters at Oelwein, Iowa, has already been announced in these columns,

was born September 26, 1863, at McVeytown, Pa. He graduated from the high school at Hampton, Iowa, and began railway work April 1, 1881, with the Illinois Central at Waterloo, Iowa, as machinist apprentice. After serving an apprenticeship of four years he worked two years as journeyman machinist, and in April, 1887, was made roundhouse foreman at Clinton, Ill. He remained in that position for five years, when he was transferred to Waterloo as machine shop foreman, and in October, 1896, he was promoted to general foreman in charge of the Waterloo shops. In December, 1900, he was made division foreman at Fort Dodge, Iowa, and in April, 1902, again returned to Waterloo in charge of the new shops as general foreman. Mr. Crownover was made master mechanic at Freeport in November, 1902, and two years later was transferred to Chicago as shop superintendent in charge of the Burnside shops. He left the Illinois Central in December, 1909, to become master mechanic of the Chicago



G. M. Crownover.

Great Western at Oelwein, Iowa, which position he held until September 1, when he was promoted to superintendent of motive power, as above noted.

I. S. Downing, whose appointment as master car builder of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, has been announced in these columns, was born at Bentonville, Ohio. He began railway work in April, 1886, as a car cleaner for the Flint & Pere Marquette, and from February, 1890, to February, 1892, was foreman of passenger work. He then went to the Lake Shore & Michigan Southern as a car cleaner at Toledo, Ohio, and from April, 1893, to March, 1895, was an inspector at Air Line Junction, Ohio. On the latter date he was made yard foreman at that point, and in November, 1899, was advanced to general foreman at the same place. Five years later Mr. Downing was appointed master car builder of that road at Englewood, Ill., and in August, 1906, he was transferred to Collinwood, Ohio, as master car builder. He held the latter position until September 1, when he became master car builder of the Cleveland, Cincinnati, Chicago & St. Louis, as above mentioned.

Purchasing Officers.

R. W. Simpson has been appointed general fuel agent of the Intercolonial and the Prince Edward Island railways, with headquarters at Moncton, N. B.

Special Officers.

The operation of hotels and camps in Glacier National Park has been placed in the hands of the dining and sleeping car department of the Great Northern, and F. L. Hay, superintendent of that department, has been placed in charge, succeeding J. M. Cathcart.

OBITUARY.

William Armstrong Ingham, formerly president of the East Broad Top Railroad and Rock Hill Iron & Coal Co., died on September 23, at Philadelphia, Pa., at the age of 87. At the time of his death he was president of a number of industrial companies, also a member of the American Philosophical Society.

NEW RAILWAY IN SOUTHERN INDIA.—It is announced that a project has been submitted to the government of Mysore for constructing the 75-mile Mysore-Hassan railway from the city of Mysore, where it will connect with the Madras & Southern Mahratta Railway to the town of Hassan, which has no railway connection. The estimated cost of \$1,656,800 includes bridge construction. The three main bridges will span the Lakshmanathirtha, the Cauvery and the Hemavati rivers, and will cost \$97,300, \$48,650, and \$32,433, respectively. The country through which this railway will run is mostly flat, involving no steep gradients. The new line is destined to fill a long-felt need and gives promise of yielding good financial returns, as it will open up large and productive areas, such as the fertile Cauvery and Hemavati valleys, and will also tap important coffee and timber lands in the State of Mysore and the Province of Coorg. It is expected that active construction work on the new line will begin in the near future. In this connection it is of interest to note that in the State of Mysore there exists a marked predilection in favor of the employment of American materials and principles in construction work generally.



I. S. Downing.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE WESTERN RAILWAY OF MINAS, BRAZIL, has ordered 3 consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 13 in. x 16 in., the diameter of the driving wheels will be 33 in., and the total weight in working order will be 53,000 lbs.

THE TOLEDO TERMINAL RAILWAY has ordered two superheater consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 22 in. x 28 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 198,000 lbs.

THE CHICAGO JUNCTION RAILWAY has ordered 1 superheater six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 149,000 lbs.

THE NIGERIAN RAILWAYS OF AFRICA have ordered 2 superheater mountain type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18 in. x 23 in., the diameter of the driving wheels will be 42½ in., and the total weight in working order will be 140,000 lbs.

CAR BUILDING.

THE CHICAGO & NORTH WESTERN is in the market for 1,000 gondola cars.

THE PHILADELPHIA & READING has ordered 50 passenger coaches from the Harlan & Hollingsworth Corporation.

THE MAINE CENTRAL has ordered 3 smoking cars, 2 coaches, 2 combination baggage and mail cars, 2 baggage cars and 2 postal cars.

THE PENNSYLVANIA RAILROAD is said to be in the market for 16 combination passenger and baggage cars. This item has not been confirmed.

THE CHICAGO, BURLINGTON & QUINCY has ordered 15 combination baggage and mail cars and 10 postal cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL LINES have ordered 55 coaches and 31 mail cars from the Pressed Steel Car Company, 90 coaches and 45 baggage cars from the American Car & Foundry Company, 30 combination baggage and mail cars, 20 coaches and 8 dining cars from the Pullman Company, and about 100 passenger train cars from the Standard Steel Car Company.

IRON AND STEEL.

GENERAL CONDITIONS IN STEEL.—It is estimated that the volume of business in rolled steel products in the last week has fallen off from 10 to 20 per cent. as compared with the orders booked during the first half of the current month. Consumers are inclined to be more conservative, anticipating lower prices because of the probable effect of the new tariff, but manufacturers point out that even if the tariff bill is enacted soon it will be several months, possibly six months, before the full effect of the measure can be determined. There is no doubt, however, that the large steel companies will protect their interests in the domestic market against foreign competition, as well as competing more actively for international trade.

SIGNALING.

The Alabama Great Southern is to install automatic block signals between Moundville and Livingston, 46 miles, and in connection with this work will lay long passing tracks at Eutaw, Trustville, Montlake and High Point. With the completion of this work the road will have a stretch of 123 miles equipped with automatic block signals, namely, from Woodstock, Ala., to Meridian, Miss.

Supply Trade News.

The Bryan & Texas Central is in the market for 2 gasolene passenger cars. W. E. Saunders, Bryan, Tex., is president.

Judge Carpenter, of the federal court at Chicago, has ordered the Central Trust Company, receiver, to ask bids for the sale of the Union Car & Equipment Company, West Pullman, Ill., which recently filed a petition in bankruptcy.

The Strauss Bascule Bridge Company, Chicago, has recently received orders for the following railroad bridges: One 105 ft., single leaf, double-track bridge with two 10 ft. wagon roads and two 6 ft. sidewalks over the Islais Creek channel at Kentucky street, San Francisco, Cal., for the Atchison, Topeka & Santa Fe and the Southern Pacific; one 90 ft., single-leaf, double-track bridge over the East Chicago canal, for the Baltimore & Ohio Chicago Terminal, and one 99 ft., single-leaf, single-track bridge over the Galena river at Galena, Ill., for the Illinois Central.

George H. Ross, formerly executive vice-president of the Chicago & Alton, Toledo, St. Louis & Western, Minneapolis & St. Louis and Iowa Central, and E. S. Wortham, who was formerly assistant to Mr. Ross and until recently manager of purchases and supplies of the Chicago & Alton, have formed a partnership for the handling of a general railway supply business under the name of the Ross-Wortham Company, in addition to representing the Scullin-Gallagher Iron & Steel Company of St. Louis, with offices at 418 McCormick building, Chicago. Mr. Ross is president of the company and Mr. Wortham vice-president.

"Made in Detroit," week during which the downtown merchants of Detroit, Mich., gave up their show windows to local manufacturers, was one of the most successful industrial exhibits ever held in Detroit, and will be made an annual feature. Among the exhibitors was the Detroit Lubricator Company, which exhibited among other devices a stand with three mechanical force feed oilers, pumping against a pressure of 200 lbs., and a duplicate of the big No. 72, eight-feed Bullseye locomotive lubricator used on the largest locomotive lubricator in the world—a superheater Mallet locomotive on the Virginian Railway.

Charles W. Allen, a vice-president and a director of the L. J. Bordo Company, Philadelphia, Pa., has been made manager of the railway department of the Reading-Bayonne Steel Castings Company, with office in Reading, Pa. Mr. Allen received his education in the Tamaqua schools and served an apprenticeship as machinist in the Tamaqua shops of the Philadelphia & Reading. After several years he was made engine house foreman at Milton, where he remained six years. In 1904 he was transferred to Reading as master mechanic of the Reading & Harrisburg division. He resigned this position on January 1, 1907, to become railroad representative of the L. J. Bordo Company. In 1908 he was made a vice-president and director of that company, which position he retained until his appointment as manager of the railway department of the Reading-Bayonne Steel Castings Company, as mentioned above.

TRADE PUBLICATIONS.

VALVES.—Jenkins Bros., New York, have published an illustrated folder describing and pointing out the advantages of their various types of valves.

NUTS AND BOLTS.—The Kansas City Bolt & Nut Company, Kansas City, Mo., has published, in an illustrated booklet, a full list of its different products; dimensions and prices are included.

UNDERGROUND RAILWAY FOR NAPLES.—A British consular report states that a concession for an underground railway under Naples has been granted to a French syndicate.

PROPOSED LINES FOR AUSTRALIA.—A bill is to be introduced into the parliament of South Australia to provide for the construction of a line from Pinnaroo to Murrayville, a distance of about 15 miles, at an estimated cost of \$329,000, including \$25,000 for rolling stock, and a line about 18 miles long from Mount Gambier to Mumbannar, at an estimated cost of \$503,390.

Railway Construction.

ANTHONY & NORTHERN.—An officer writes that the plans call for building from Pratt, Kan., north via Larned or via Great Bend, to Hastings, Neb., about 225 miles. The first section of six miles from Pratt north to Iuka has been completed. A contract has been given to Davis & Abernathy, for work on 21 miles, and additional contracts are to be let at once. The plans include building a steel bridge over the Arkansas river, also terminal buildings. O. P. Byers, president, Pratt, Kan. (August 8, p. 253.)

BRYAN & TEXAS CENTRAL.—An officer writes that this company was organized to build from Bryan, Tex., via Stone City to Wilcox. The company now has 15 miles in operation and ten miles additional have been graded. The work includes a steel bridge 297 ft. long over the Brazos river and a trestle over Little Brazos river. In addition to the use of steam motive power, gasoline motor cars are to be used on the line. The principal commodities to be carried are cotton, corn, merchandise, crushed rock, timber and wood. W. E. Saunders, president, C. B. Carson, chief engineer, and L. M. Hewit, traffic manager, Bryan.

CAMDEN, SUMMERVILLE & GAULEY BRIDGE RAILROAD.—Incorporated in West Virginia with \$50,000 capital, to build a railroad in Camden, Webster county, W. Va. The incorporators include J. J. Mead, Pittsburgh, Pa.; H. L. Kirtley, G. W. McClintick, W. G. Matthews and J. Carnes, Charleston, W. Va.

CHICAGO & NORTH WESTERN.—The report of this company for the year ended June 30, 1913, shows that an aggregate of 54 miles of yard tracks, sidings and industrial spurs were added during the year, and to provide for additional yard tracks, the company bought 60 acres of land adjoining the right of way near Waukegan, Ill., and about 186 acres near Kenosha, Wis. The Des Plaines Valley Railway, a double track outer belt line, from the Proviso yard on the Galena division to a point between Northfield and Blodgett, Ill., on the Wisconsin division, 20.51 miles, has been completed; the St. Louis, Peoria & Northwestern under construction from Peoria, Ill., to a point near Girard, 90.6 miles, is nearing completion. The Macoupin County Extension Railway was organized by the C. & N. W. in May, 1913, to build from a connection with the Macoupin County Railway near Benld, south about nine miles, to coal fields in Macoupin and Madison counties, Ill., and the Iowa Southern was organized in January, 1913, to build from a connection with the C. & N. W. in Monroe county, Iowa, southwesterly for about 25 miles, and construction work is now under way on about 13 miles.

CLARKSBURG-NORTHERN.—An officer of this company, which was organized to build from New Martinsville, W. Va., south to Middlebourne, thence southeast via Shirley, Center Point, Sedalia and Lynch, to Clarksburg, 63 miles, writes that track has been laid on six miles. A contract was given to J. T. Adams, Columbus, Ohio, last January, for the grading work, also to build the trestles and lay the tracks on 28 miles, to complete the line to Shirley. The work involves handling about 9,000 cu. yds. to the mile. Maximum grades will be 2 per cent, and maximum curvature 10 deg. The work has been suspended since March 1, owing to a controversy over the ownership, and it is understood that active construction work will not be under way until next spring. B. M. Robinson, president, New York, and H. M. Fry, chief engineer, 524 West Fourth street, Erie, Pa.

FAIRMOUNT & VEBLEN.—An officer writes that the company expects to have grading work finished by October 1, on the line now building from Veblen, in Marshall county, S. Dak., east, thence north to Fairmount, N. Dak., 50.5 miles. Track has been laid on 30 miles. Brolander & Whittier, Northfield, Minn., have the grading contract. The work is light, and calls for the handling of about 8,000 cu. yds. to the mile. The principal commodities to be carried are grain and live stock. Julius Rosholt, president, Minneapolis, Minn., and J. H. Thomas, chief engineer, Fairmount, N. Dak. (May 2, p. 1013.)

HOUSTON & TEXAS CENTRAL.—An officer writes that work is now under way on a cut-off between Eureka, Tex., and Stella, about 10 miles, to cost about \$290,000. The line is being built to facilitate the handling of cotton and other through freight from north and central Texas points to Galveston, eliminating

the delay heretofore occasioned by handling through the Houston yards. About three miles of track has been laid and all the work is expected to be finished in about sixty days.

HUDSON BAY RAILWAY.—An officer writes that track has been laid on about 100 miles of the line now under construction from The Pas, Man., northeast to Port Nelson, 420 miles. J. D. McArthur, Winnipeg, Man., has the contract for building the line. The work involves handling about 1,500 cu. yds. of rock and about 15,000 cu. yds. of other materials to the mile. There will be a number of steel bridges with a total length of 2,600 ft. on the line, and at Port Nelson the terminals and harbor improvements will cost \$10,000,000. The company expects to develop a traffic in export wheat, agricultural products, imports, coal and steel products. J. Armstrong, chief engineer, Winnipeg, Man. (December 20, p. 1235.)

ILLINOIS CENTRAL.—The report of this company for the year ended June 30, 1913, shows that arrangements were made to raise the grades between Mounds and Cairo Junction, Ill. This work is now in progress and when completed will bring the track from Mounds south to the Ohio river approach above any probable high water. This company suffered severely from floods during March, which necessitated a great deal of replacement work. During the year, 105 new industrial tracks were added, with an aggregate length of 16.33 miles, and 107 new company sidings were added, the additional mileage being 27.38 miles. The remainder of the second main track between Ponchatlula and Orleans Junction, La., was completed and put in operation in November, 1912. Work was continued during the year on the grade crossing elimination work at Grand Crossing, Chicago.

LORAIN, ASHLAND & SOUTHERN.—An officer of this company, which operates a line from Custaloga, Ohio, northwest to Ashland, 21.2 miles, writes that the company expects to have the work finished by January 1, 1914, on the extension from Ashland, north via Wellington and Oberlin to Lorain. McArthur Brothers Company is carrying out the grading work, and about 22 miles of track has been laid. The heaviest cut requires the handling of about 54,000 cu. yds., and the average cost a mile for the construction is \$35,000. The company will use electricity as the motive power for passenger service, and steam as the motive power for freight service.

LEXINGTON & EASTERN.—See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—According to press reports a contract has been given to the Adams & Sullivan Construction Company for building the extension of the Lexington & Eastern up Rock House creek in Letcher and Knott counties, Ky. (July 4, p. 36.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has executed two agreements with the New York Municipal Railway Corporation (Brooklyn Rapid Transit) for important modifications of the Dual System subway contracts, by which the construction and operation of two important links in the Brooklyn system will be expedited. One agreement covers the construction of the Thirty-eighth street line, in the borough of Brooklyn, from Fourth avenue to Tenth avenue, to be part subway and part open cut, and which will connect the Fourth avenue subway with the new elevated roads to be built over the routes of the Culver Line and the new Utrecht avenue line to Coney Island. The other agreement covers the remaining construction work in the Centre street subway loop, in the borough of Manhattan, already under partial operation by the elevated trains of the Brooklyn company. At present only the two westerly tracks in this subway are being operated. Under the new agreement the other two tracks will be equipped for use, certain cross-overs will be constructed, the Essex street station on the Williamsburg bridge will be reconstructed and the station at Chambers street, underneath the Municipal building, altered so as to permit the entrance of the track connection with the Brooklyn bridge now under construction. The Brooklyn company agrees to have the work under both agreements completed within 18 months.

The form of contract for section No. 3, of the Seventh avenue subway, in the Borough of Manhattan, to be operated by the Interborough Rapid Transit Company, has been completed by the Public Service Commission, First district, and submitted to the railway company for approval. This subway will be a four-track line running from Times Square south through Seventh

avenue, Varick street, and other streets, to the Battery and to Brooklyn. Section No. 3 begins at a point under Varick street, about 100 ft. south of the southerly building line of Beach street, and runs northerly under Varick street and Seventh avenue extension to a point opposite the southerly building line of Commerce street. This section of the subway will be a four-track line. The Interborough company is to return the contract to the commission within ten days, after which it will be adopted and advertised for bidders. Bids are to be opened on October 1, for section No. 2, which is immediately south of this section. (September 19, p. 541.)

NORFOLK SOUTHERN.—An officer writes regarding the extension of the Raleigh, Charlotte & Southern from Mt. Gilead, N. C., west to Charlotte, 53 miles, that the entire line has been graded and track laying finished except on a 14-mile section. There are two steel viaducts not yet completed on this section, one over Big Long creek, about seven miles west of Norwood, and the other over Rocky river, 14 miles west of Big Long creek. It is expected that the bridges will be completed about the middle of October, and all the track will be laid, so that trains can be operated into Charlotte by November. (July 11, p. 77.)

RALEIGH, CHARLOTTE & SOUTHERN.—See Norfolk Southern.

ST. JOHN & QUEBEC.—An officer writes that contracts are to be let this autumn to build an 80-mile section of the 210-mile line between St. John, N. B., and Grand Falls, of which 120 miles are already under construction. The contractors now at work include Cobett & Sons, and the Hibbard Company, Ltd., of Fredericton, N. B., and Kennedy & McDonald, of Woodstock. Track has been laid on 40 miles. The grading work involves handling about 20,000 cu. yds. a mile. The line will have 1 per cent. grades north of Fredericton and south of that place .4 per cent. grades southbound, and 6 per cent. grades northbound. The maximum curvature will be 7 degrees. There will be one steel bridge to have a total length of about 1,950 ft. On completion the line is to be operated by the Intercolonial Railway. A. R. Gould, president, Presque Isle, Maine. R. Thompson, chief engineer, Fredericton, N. B. (August 29, p. 396.)

SAN LUIS CENTRAL.—This road was recently opened for business, it is said, from Monte Vista, Colo., north to Center, 14 miles. J. B. Cosgriff is president; T. A. Cosgriff, vice president; George McLean, treasurer; and A. T. Young, general manager, all of Denver.

RAILWAY STRUCTURES.

BUFFALO, N. Y.—The Lehigh Valley has started preparatory work towards the construction of a new passenger station on Main street, in Buffalo. Before construction work on the terminal can be begun, important changes must be made in the passenger yards. New approaches to viaducts must be built and the tracks moved over into the bed of the old Hamburg canal strip, which the railroad has secured; and a number of grade crossings are to be eliminated. The work is being done by the Eastern Concrete Steel Construction Company, and will be pushed to completion.

CHICAGO.—The report of the Chicago & North Western for the year ended June 30, 1913, shows that work was carried out during the year as follows: At Chicago a brick power house, 38 ft. x 85 ft., was constructed, and the engine house enlarged; at the Chicago shops a modern hot water boiler wash-out system was installed in a new building, and a building 40 ft. x 176 ft. was also built. At West Chicago a modern brick passenger station was completed and important additions and alterations were made in yard and track facilities. The building formerly used as a passenger station has been removed to a new location for use as a freight house. An overhead highway bridge connecting Parker avenue and Depot street was built, and work is now under way on an overhead highway bridge extending Maple avenue across the C. & N. W. tracks. An overhead bridge about 3,000 ft. long, including approaches, was built at the Wolf road crossing, Proviso, Ill., to permit highway traffic to pass over the C. & N. W. freight terminal yards. At Clinton, Iowa, work is under way on a 9-stall engine machine shop, an 8-stall engine machine shop,

power house, store and office building, and an engineers' and firemen's building, which it is expected will be completed during 1913, and a 425 ft. extension has been built to the company's ice house. At Council Bluffs a brick freight house, 40 ft. x 258 ft.; a brick office building 33 ft. x 35 ft.; also a boiler house, machinery and transfer platforms and track changes have been completed. At Omaha, Neb., the C. & N. W., has jointly with the Chicago, St. Paul, Minneapolis & Omaha, built a 15-stall brick engine house, a machine shop, 50 ft. x 140 ft., an oil house, and installed an 80-ft. turntable. At Milwaukee, Wis., a two-story brick freight house, 50 ft. x 360 ft. was built, and at Green Bay, a 40-stall brick engine house, power house, store and oil house, cinder pit, turntable, coal and water station and ice house, including necessary trackage, are under construction. At Ashland, Wis., ore dock No. 1, has been partially rebuilt and its total capacity greatly increased. Modern brick passenger stations were also completed during the year at Evansville, Wis., and at Waseca, Minn.

PANA, ILL.—The report of the Illinois Central for the year ended June 30, 1913, shows that during the year this company built new passenger stations at Pana, Paxton, Boos, Oglesby, Matlock, Iowa, and at Mayfield, Ky., and new freight houses were put up at Cairo, Ill., Manchester, Iowa, and Jackson, Miss. The station buildings were enlarged at Christopher, Ill., Waterloo, Iowa, White Plains, Ky., Hazlehurst, Miss., Belmont and Holcut. The work of constructing a new passenger station at Memphis, Tenn., to be used jointly with the St. Louis & San Francisco and the Chicago, Rock Island & Pacific, was started during the year, and elevation of the tracks from Broadway to Huling avenue, Memphis, is also in progress. New mechanical coaling plants were erected at Springfield, Ill., and at Hammond, La. In connection with the classification yard at Centralia, Ill., a new mechanical terminal consisting of a 48-stall roundhouse, machine, boiler and blacksmith shop, together with power house, storehouse, coaling station, wood mill, car repair shed and shops, and two water tanks, were also constructed, and the work of installing a new mechanical plant at Nonconnah, Tenn., has recently been started and is now under way. During the year 4,061 lineal feet of permanent bridges and trestles were constructed, replacing timber and pile bridges, trestles and embankments; 2,133 lineal feet of permanent bridges and trestles were rebuilt or replaced by embankment, and 10,411 lineal feet of timber and pile bridges and trestles were rebuilt or replaced by embankment.

PORT NELSON, MAN.—See Hudson Bay Railway under Railway Construction.

NEW LOCOMOTIVES FOR INDIAN LINE.—Sanction has been accorded to the addition of 10 passenger engines to the motive power of the 5 ft. 6 in. gage system of the Bombay, Baroda & Central India Railway during 1914.

NEW LINE FOR AUSTRALIA.—The bill for the construction of a railway from Condobolin to Broken Hill has been passed by the Legislative Council of New South Wales. The line will be 372 miles long, and is to be laid with 80 lb. rails, the total cost being estimated at \$6,500,000. Steam motive power is to be used. This new line will shorten by 24 hours the journey between Adelaide and Sydney, and will also form a link in a transcontinental line from Western Australia to Queensland.

PROPOSED RAILWAY UP BEN NEVIS, SCOTLAND.—Wide interest is being taken in the proposition of building a tourist hotel on the summit of Ben Nevis, Scotland's highest mountain. The hotel will occupy the site of the former Meteorological Observatory, and when completed will be reached by a railway five miles long, the construction of which is estimated to cost about \$150,000. In ordinary seasons, Ben Nevis is climbed by fully 15,000 people. Assuming that one-half of the tourists, taking that number as a basis patronize the railway, the promoters expect to realize an annual income of about \$10,650 on proposed charge of 24 cents for single and 36 cents for return fare. Should the project materialize as expected, visitors can travel by rail to the highest altitude in the British Isles and sojourn in comfort for a brief period. The Duke of Montrose and other influential men are promoters of the undertaking, and the consulting engineers are Stevenson & McGuffie, Hope street, Glasgow.

Railway Financial News.

BALTIMORE & OHIO.—See an item in regard to this company under General News.

Kuhn, Loeb & Co. and Speyer & Co., both of New York, bought from the company and sold to the public \$10,000,000 4½ per cent. equipment trust certificates of April 1, 1913, maturing \$1,000,000 annually beginning April 1, 1914. The certificates were offered to the public at a price yielding 5½ per cent. interest on the investment.

John P. Green and Joseph Wood, both representing Pennsylvania interests, have resigned from the board of directors of the Baltimore & Ohio.

FITCHBURG.—Stockholders voted on September 24 to approve the issue of \$2,100,000 bonds, of the proceeds of the sale of which \$500,000 is for refunding and the remainder for additions and betterments.

FORT DODGE, DES MOINES & SOUTHERN.—Judge McPherson has set the date for the foreclosure sale of this property for November 29. The upset price is \$2,676,000. The road will be sold in parcels, the main line running from Des Moines to Rockwell City forming one parcel; the road from Colfax to Newton another, and the road from Des Moines Junction to Goddard another.

NEW YORK, NEW HAVEN & HARTFORD.—Dr. Arthur T. Hadley, president of Yale University, and James H. Hustis have been elected directors, succeeding D. H. Warner and S. W. Winslow. See editorial comment in regard to the election of Dr. Hadley.

ST. LOUIS & SAN FRANCISCO.—B. F. Yoakum is quoted in the *Wall Street Journal* as follows, in regard to the separation of the Frisco and the New Orleans, Texas & Mexico:

"An adjustment of the relation between the 'Frisco and the New Orleans, Texas & Mexico will, I am confident, be reached at an early date.

"The 'Frisco is a western property and as such all matters pertaining to its future and all controversies between the different interests will be adjusted in the West.

"Under the laws of the State of Missouri under which 'Frisco holds its charter and in compliance with the laws of other states which these lines serve it may be difficult to get an amicable settlement of all the differences. It took about fifteen years to get these properties together, but adjustments, once they get started, will rehabilitate these properties quickly.

"All such matters, however, can be best handled in the states where the lines are located and in compliance with the laws of the various states which these lines serve. Most of these states have radically changed their laws since the properties constituting the 5,200 miles of the 'Frisco system were merged. Therefore in the rehabilitation of the 'Frisco the changed laws of the several states must necessarily be taken into consideration."

TONOPAH & GOLDFIELD.—A dividend of 3½ per cent. has been declared on the common stock and 7 per cent. on the preferred stock. Last year a total of 7 per cent. was paid on the common and 7 per cent. on the preferred.

UNION PACIFIC.—At the executive meeting on September 23 only routine business was discussed. A director is quoted as saying: "Not only is the time for declaring an extra distribution altogether unsettled, but the manner and the very fact that there shall or shall not be such a distribution are as yet entirely undetermined."

WILLIAMSVILLE, GREENVILLE & ST. LOUIS.—R. E. Slowey, of Greenville, Mo., has been appointed receiver.

MACHINE SHOP FOR CHILEAN GOVERNMENT RAILWAYS.—A machine shop, to cost \$47,014, is being constructed for the Chilean Government Railways at Temuco.

RE-OPENING THE NEAR EAST RAILWAYS.—The Servian government having declared its readiness to restore railway communication, two trains are now running daily between Sofia and Belgrade.

ANNUAL REPORTS.

ILLINOIS CENTRAL RAILROAD COMPANY.

REPORT OF THE BOARD OF DIRECTORS.

To the Stockholders of the Illinois Central Railroad Company:

The Board of Directors herewith submit the following report of the operations and affairs of your Company for the year ended June 30th, 1913: The number of miles of road operated on June 30th, 1912, was....4,762.70 There was no change in the road mileage during the year and in consequence the number of miles of railroad operated on June 30th, 1913, as well as the average number of miles operated during the year, was.....4,762.70

INCOME.

The following Income Account for the year is stated in accordance with the classification of the new form of Income Account promulgated by the Interstate Commerce Commission, effective July 1, 1912, and the account of the preceding year has been re-stated for purposes of comparison, the amounts accrued on the Company's holdings of securities of its own issue being eliminated from "Other Income" and from "Deductions from Gross Income."

	1913.	1912.	INCREASE + DECREASE -
Average miles operated during year	4,762.70	4,762.70	.....
Railway operating revenues:			
Freight	\$42,589,298.68	\$37,881,765.94	+\$4,707,532.74
Bridge tolls and miscellaneous freight	3,371,419.24	2,798,905.54	+ 572,513.70
Passenger	13,455,884.45	13,337,562.40	+ 118,322.05
Bridge tolls and miscellaneous passenger	248,202.36	264,728.59	- 16,526.23
Mail	987,249.52	962,848.30	+ 24,401.22
Express	1,788,530.02	1,851,584.23	- 63,054.21
Other passenger train	528,874.50	418,748.17	+ 110,126.33
Other transportation	778,173.47	769,023.37	+ 9,150.10
Revenue from operations other than transportation	533,270.78	442,105.63	+ 91,165.15
Total railway operating revenues	64,280,903.02	58,727,272.17	+ 5,553,630.85
Railway operating expenses:			
Maintenance of way and structures	8,519,024.94	7,691,214.55	+ 827,810.39
Maintenance of equipment	13,952,654.02	13,857,548.66	+ 95,105.36
Traffic expenses	1,320,583.43	1,400,941.84	- 80,358.41
Transportation expenses	24,743,324.38	23,653,249.18	+ 1,090,075.20
General expenses	1,513,324.80	1,518,512.31	- 5,187.51
Total railway operating expenses	50,048,911.57	48,121,466.54	+ 1,927,445.03
Net revenue — rail operations	14,231,991.45	10,605,805.63	+ 3,626,185.82
Outside operations:			
Revenues	505,511.58	493,378.32	+ 12,133.26
Expenses	583,103.98	600,735.22	- 17,631.24
Net deficit — outside operations	77,592.40	107,356.90	- 29,764.50
Net railway operating revenue	14,154,399.05	10,498,448.73	+ 3,655,950.32
Railway tax accruals	2,903,550.98	2,685,730.13	+ 217,820.85
Railway operating income	11,250,848.07	7,812,718.60	+ 3,438,129.47
Other income	5,999,351.71	4,370,759.66	+ 1,628,592.05
Gross income	17,250,199.78	12,183,478.26	+ 5,066,721.52
Deductions from gross income	10,675,086.91	8,717,030.39	+ 1,958,056.52
Net income	6,575,112.87	3,466,447.87	+ 3,108,665.00
Disposition of net income:			
Appropriated for additions and betterments .....	.....	61,481.44	- 61,481.44
Balance transferred to credit of profit and loss	6,575,112.87	3,404,966.43	+ 3,170,146.44

REVENUES.

While it was expected that the business for the current year would show a material increase as compared with the preceding year owing to the many disturbing factors which occurred in that period, it is gratifying to report that the operating revenues for the current year were \$64,280,903.02 compared with \$58,727,272.17 for the preceding year, an increase of \$5,553,630.85, or 9.46 per cent, and that, notwithstanding the fact that the Company was handicapped by the flood conditions in the southern states which entirely stopped the movement of traffic between the northern and southern lines for a period of nine days, the revenue from the transportation of freight and the revenue from the transportation of passengers were the largest in the history of your Company, the freight revenue being \$1,085,313.45, and the passenger revenue \$118,322.05, greater than in any prior year.

Compared with the previous fiscal year, the revenue from the transportation of freight increased \$4,707,532.74, or 12.43 per cent, and the increase was general over the northern, southern and western lines. The tons of revenue freight carried were 30,447,165 compared with 26,339,149 tons. The principal commodities transported, as well as a comparison of the tonnage of such commodities with the previous year, are shown on Table No. 13.

Revenue from the transportation of passengers increased \$118,322.05, or .89 per cent compared with the previous year. The passenger revenue on the northern and western lines showed a satisfactory increase; but there was a decrease on the southern lines.

The general details of the freight and passenger traffic are shown in Table No. 12.

EXPENSES.

The operating expenses increased \$1,927,445.03, or 4.01 per cent, being \$50,048,911.57 compared with \$48,121,466.54 for the preceding year.

MAINTENANCE OF WAY AND STRUCTURES.

Maintenance of way and structures expenses increased \$827,810.39, or 10.76 per cent. There was a large increase in expenditures on roadbed and bridges occasioned by the damage caused by the floods in the spring months and by the general use of heavier equipment on all main lines. There were also substantial charges to operating expenses in connection with the erection of a new mechanical plant at Centralia, Illinois, and other important additions and betterments, as well as large charges on account of a greater number of cross-ties placed in the track and a greater number of miles of rail laid replacing rail of lighter weight.

The following important renewals were made, the entire cost of which was charged to operating expenses:

2,218,420 cross-ties were renewed, being equivalent to 739.49 miles of continuous track, or 11.2 per cent of all ties in track including sidings.

There were 7.25 miles of track relaid with new steel rail and 1.59 miles with second-hand rail replacing rail of the same weight.

5,871 linear feet of timber and pile bridges were rebuilt or replaced by embankments.

1,010 linear feet of iron pipe culverts and 3,308 linear feet of concrete pipe culverts were put in.

565 miles of ballasted track were repaired or renewed to restore to original standard.

Information is given under the head of "Physical Changes" on page 10 of this report as to work charged wholly to "Additions and Betterments" as well as work charged partly to "Additions and Betterments" and partly to "Renewals."

MAINTENANCE OF EQUIPMENT.

There was an increase in maintenance of equipment expenses of \$95,105.36, or .69 per cent.

Charges for depreciation of equipment amounted to \$1,560,730.56, compared with \$1,576,957.82 for the preceding year, a decrease of \$16,227.26.

Owing to the strike of shop employees on September 30th, 1911, of which mention was made in the annual report of last year, it was necessary to secure practically a new force of shopmen on all of your Company's lines, and until these employees became accustomed to their new surroundings and conditions, they were unable to perform the same amount of work which had previously been turned out by a corresponding number of the employees who had left the service. However, the new men have rapidly increased in efficiency with the result that during the last few months of this fiscal year we have not only been able to keep up our current repairs, but have made material strides in taking care of such work as had accumulated. As considerable work was deferred during the previous year, a comparison of the important work performed this year is made with the year ending June 30th, 1911.

358 locomotives received general repairs compared with 340 for the year 1911, and 323 received thorough repairs compared with 335 for the year 1911.

57,963 freight cars received medium repairs compared with 54,466 for the year 1911, and 31,060 received heavy repairs compared with 30,435 for the year 1911.

453 passenger train cars received general repairs compared with 371 for the year 1911, and 151 received thorough repairs compared with 124 for the year 1911.

The average mileage per serviceable locomotive for the year was 30,976.

The average age of locomotives was 12.77 years compared with 13.98 years for the preceding year, of revenue freight cars 10.19 compared with 9.86 years for the preceding year, and of passenger train cars 17.8 years compared with 19.1 years for the preceding year.

TRAFFIC EXPENSES.

There was a decrease in traffic expenses of \$80,358.41, or 5.74 per cent. A general agency was established at Portland, Oregon.

TRANSPORTATION EXPENSES.

Transportation expenses increased \$1,090,075.20, or 4.61 per cent. The increase is in large part accounted for by the increased business handled, the tons of all freight carried one mile having increased 17.44 per cent, and the revenue passenger carried one mile .25 per cent. There was also a substantial portion of the increase chargeable to the congestion of traffic following the flood conditions in the South, to the increased price per ton paid for fuel, to the settlement of a number of large personal injury claims sustained in previous years which have been in litigation, and to the constantly growing loss and damage claims.

GENERAL EXPENSES.

There was a decrease in general expenses of \$5,187.51, or .34 per cent.

TAXES.

Taxes increased \$217,820.85, or 8.11 per cent.

There was a substantial increase in the Charter Tax in Illinois owing to the greatly increased gross revenue on our Charter Lines. There were also increases in taxes in the States of Iowa and Mississippi and in the State of Illinois on properties other than the Charter Line.

FINANCIAL.

The financial condition of the Company at the close of the fiscal year compared with the previous fiscal year is shown in the general balance sheet, Table No. 4.

CAPITAL STOCK AND FUNDED DEBT.

There was no change in the capital stock during the year.

During the month of July, 1912, \$15,000,000 Four and One-Half Per Cent Secured Gold Notes due July 1st, 1914, were issued and sold.

\$1,000,000 Refunding Mortgage Four Per Cent Gold Bonds of 1955 were issued and sold in January, 1913.

\$8,000,000 Illinois Central Equipment Trust, Series "A," certificates were issued and sold during the month of February, 1913.

In accordance with the terms of the indenture, \$2,000,000 First Lien Equipment Bonds were delivered to the trustee and cancelled.

SECURITIES OWNED.

The First, Second and Third Preference Income Bonds of the Central of Georgia Railway Company purchased during the preceding fiscal year were sold to that company, and \$15,000,000 of Central of Georgia Railway Company's six per cent Cumulative Preferred Stock was purchased at par. The stock purchased was pledged as part security for your Company's four and one-half per cent Secured Gold Notes due July 1st, 1914.

The Company also purchased the following securities: \$240,000 par value of the capital stock of the Bell Railway Company of Chicago; \$520,000 par value of the common stock and \$150,000 par value of the preferred stock of the Chicago, Memphis & Gulf Railroad Company. \$44,220.75 of bonds and scrip of The Yazoo & Mississippi Valley Railroad Company's Gold Improvement Bonds of 1934, were received in payment for amounts advanced by your Company for construction.

\$12,500 par value of Peoria & Pekin Union Railway Company's five per cent Debenture Bonds matured August 1st, 1912, and were redeemed by that company.

\$1,000,000 par value of Louisville Division and Terminal three and a half per cent Bonds of 1953, held in the treasury were sold during February and March, 1913.

\$40,000 par value of preferred stock and \$40,000 par value of common stock of the Chicago Union Transfer Railway Company were sold.

INSURANCE AND OTHER FUNDS.

The Insurance Fund was augmented during the year by charges to operating expenses; and other charges have been made as follows:

	Year Ending June 30, 1913.	Year Ending June 30, 1912.
Amount at credit of fund July 1st.....	\$2,086,259.39	\$2,067,701.58
Added through monthly charges to operating expenses.....	60,000.00	60,000.00
Collected from lessees account of insurance.....	3,417.18	4,059.37
Interest received on investments of the fund.....	84,300.00	83,100.00
Fire losses collected.....	13,670.74	23,198.63
	<hr/>	<hr/>
	\$2,247,647.31	\$2,238,059.58
Losses by fire.....	\$ 110,234.11	\$ 107,102.41
Premiums paid for reinsurance.....	47,568.66	44,697.78
	<hr/>	<hr/>
	\$ 157,802.77	\$ 151,800.19

Amount at credit of fund June 30th..... \$2,089,844.54 \$2,086,259.39

The various sinking funds as of June 30, 1913, are as follows:

Cairo Bridge Contingent Fund, \$504,180.00.

Cairo Bridge Sinking Fund, \$281,552.63, an increase of \$29,886.27. Sinking Fund for Western Lines Bonds, \$1,222,634.27, an increase of \$93,153.60.

Sinking Fund for Omaha Division Bonds, \$159,796.44, an increase of \$15,955.00.

The additions during the year to the several sinking funds amounted to \$138,994.87.

ADDITIONS AND BETTERMENTS.

There was expended during the year for Additions and Betterments (including improvements on subsidiary properties) \$10,119,157.82. The following is a classified statement of these expenditures:

ADDITIONS AND BETTERMENTS PAID FOR FROM	ADDITIONS AND BETTERMENTS APPROPRIATED	ADDITIONS AND BETTERMENTS REPRESENTED BY ADVANCES
PROCEEDS OF GENERAL REFUNDING MORTGAGE BONDS.	OUT OF PROFIT AND LOSS.	TO SUBSIDIARY LINES.
Right of way and station grounds.....	\$ 102,927.97	\$ 122,481.38 Cr. \$ 297.90
Real estate.....	34,289.40	Cr. 37,046.55 Cr. 18,830.56
Widening cuts and fills.....	900.00	..... 22,953.96
Protection of banks and drainage	2,135.46	..... 28,552.05
Grade reductions and changes of line.....	682.67	..... 2,583.50
Bridges, trestles and culverts.....	148,156.10	61,191.34 239,203.20
Increased weight of rail.....	29,932.03	18,118.16 94,637.36
Improved frogs and switches.....	1,166.22	..... 669.38
Track fastenings and appurtenances	99,772.32	5,700.71 145,144.21
Ballast.....	.....	..... 57,703.94
Additional main tracks.....	72,066.22	16.34 195,601.34
Sidings and spur tracks.....	235,503.33	5,583.69 153,314.98
Terminal yards.....	341,384.70	..... 32,242.20
Fencing right of way.....	382.19	..... 2,106.61
Improvement of crossings under or over grade.....	16,530.35	.....
Elimination of grade crossings.....	116,597.61	..... 38,625.60
Interlocking apparatus.....	48,673.49	..... 10,985.51
Block and other signal apparatus.....	406,073.37	..... 10,867.65
Telegraph and telephone lines.....	31,674.99	..... 2,280.34
Station buildings and fixtures.....	103,935.04	90,050.59 99,976.02
Roadway machinery and tools.....	2,040.55	..... 811.86
Shops, enginehouses and turntables.....	535,020.03	..... 65,485.99
Shop machinery and tools.....	129,204.88	..... 48,309.59
Water and fuel stations.....	53,853.22	..... 21,929.79
Grain elevators and storage warehouses.....	.....	3,294.77
Dock and wharf property.....	.....	469.54
Electric light and power plants.....	93.55	..... 694.19
Electric power transmission.....	13,079.81	2,484.65
Other additions and betterments.....	2,779.76	1,586.42 41,088.03
COVERED BY EQUIPMENT TRUST SERIES "A."		
EQUIPMENT:		
Steam locomotives.....	\$2,924,556.68	Cr. 917,034.65
Passenger train cars.....	1,175,007.58	206,979.31
Freight train cars.....	2,806,965.98	Cr. 278,434.05
Work equipment.....	.....	98,190.17
Floating equipment.....	.....	710.00
	\$6,906,530.24	\$1,639,266.04 \$ 267,682.08 \$ 1,305,679.46

The following shows the amount advanced during the year to each of the subsidiary lines, these amounts being included in total advances shown in Table No. 6 of this report:

Chicago, St. Louis & New Orleans R. R.	\$ 863,148.57
Canton, Aberdeen & Nashville R. R.	40,694.34
South Chicago R. R.	2,585.46
Blue Island R. R.	474.99
Dubuque & Sioux City R. R.	222,672.52
Kensington & Eastern R. R.	11,973.85
Mississippi & Alabama R. R.	13,921.11
Alabama Western R. R.	14,884.41
Omaha Bridge & Terminal Ry.	Cr. 2,333.81
Batesville Southwestern R. R.	27,846.20
Bloomington Southern R. R.	109,811.82
	<hr/>
	\$1,305,679.46

PHYSICAL CHANGES.

The physical condition of the Company's road and equipment was materially improved and substantial additions made to its equipment.

Below are listed the principal physical improvements, the cost of which was, in whole or in part, charged to "Additions and Betterments."

ROADWAY AND STRUCTURES: 160.62 miles of track were relaid with 90 lb. new steel rail and 11.93 miles with 75 lb. new steel rail, making a total of 172.55 miles of track relaid with new steel rail; and 46.47 miles of track were relaid with second-hand rail, all replacing rail of lighter pattern. The total mileage of track relaid with new and second-hand steel rail was 219.02, exclusive of the mileage mentioned under "Maintenance of Way and Structures" on page 6.

One hundred and five new industrial tracks were added with an aggregate length of 16.33 miles, after deducting the industrial tracks which were taken up.

One hundred and seven new Company sidings were added, the additional mileage being 27.38, after allowing for tracks taken up.

Forty-four miles of partially ballasted tracks were reballasted and brought up to present standard.

The remainder of the second main track between Ponchatoula and Orleans Junction, La., mentioned in the report for the previous year, was completed and put into operation on November 25th, 1912.

The grade crossing elimination work at Grand Crossing, Chicago, was continued, and \$119,830.43 was expended on this account during the year.

There were installed and placed in operation 349.3 miles of electric automatic block signals as follows: Between Kankakee and Gilman, Ill., 54.2 miles; Mattoon Yard, Ill., 5.4 miles; between Mattoon and Sigel, Ill., 37.6 miles; between Mason and Branch Junction, Ill., 75.2 miles; between Centralia and Carbondale, Ill., 96.0 miles; between Belleville and Coulterville, Ill., 31.0 miles; between Clark Street, Chicago, and Parkway, Ill., 20.0 miles; between Scales Mound and Portage, Ill., 17.7 miles; and between Asylum and Nogan, Miss., 12.2 miles. With the trackage previously equipped, this makes a total of 1,031.9 miles of protected track as of June 30th, 1913.

Electric block signals are being installed in the following locations: At Humboldt, Ill., 6.2 miles; at Carbondale, Ill., 8.2 miles; between Coulterville and Carbondale, Ill., 48.5 miles; and between Branch Junction and Centralia, Ill., 12.0 miles, a total of 74.9 miles. The work on the first three locations is practically completed.

An interlocking plant at Manchac Bridge, La., is in process of installation.

New passenger stations were erected at Pana, Ill.; Paxton, Ill.; Boos, Ill.; Oglesby, Ill.; Matlock, Iowa; and Mayfield, Ky.

New freight houses were erected at Cairo, Ill.; Manchester, Iowa; and Jackson, Miss.

Station buildings were enlarged at Christopher, Ill.; Waterloo, Iowa; White Plains, Ky.; Hazlehurst, Miss.; Belmont, Miss.; and Holcut, Miss.

The work of constructing a new passenger station building at Memphis, Tenn., to be used jointly with the St. Louis & San Francisco and Chicago, Rock Island & Pacific Companies was started during the year. Elevation of the tracks from Broadway to Huling Avenue, Memphis, is also in progress.

New mechanical coaling plants have been erected at Springfield, Ill., and Hammond, La.

A new pumping station was built at Independence, La. New wells were put down at Covington, Tenn., and Emden, Ill. Water station facilities were also improved at the following points: Pinckneyville, Ill.; Browns, Ill.; Freeport, Ill.; Carbondale, Ill.; Dubuque, Iowa; and Louisville, Ky.

A new car repair shed, replacing one destroyed by fire, was erected at East St. Louis, Ill. Frame engine houses were built at Water Valley, Miss.; Central City, Ky.; and Pinckneyville, Ill. Additions were made to the roundhouse at Dubuque, Iowa. At Cedar Rapids, Iowa, a four-stall enginehouse and sand and oil house, to replace facilities destroyed by fire, were constructed. A new sand house and a new cinder pit were installed at Cairo, Ill.

Power plants were improved at the following points: 27th Street, Chicago; Burnside Shops, Freeport, Ill.; Indianapolis, Ind.; Waterloo, Iowa; Sioux City, Iowa; Louisville, Ky.; Jackson, Tenn.; Water Valley, Miss.; and McComb, Miss.

In connection with the classification yard constructed at Centralia, Ill., a new mechanical terminal, consisting of a 48-stall roundhouse, machine, boiler and blacksmith shop, together with power house, storehouse, coaling station, wood mill, car repair shed and shops, and two water tanks, was also constructed.

The work of installing a new mechanical plant at Nonconnah, Tenn., has just recently been started and is now in progress.

A new turntable was installed at Matteson, Ill. Turntables replacing ones of smaller diameter were put in at Burnside, Ill.; Cairo, Ill.; Sioux City, Iowa; Waterloo, Iowa; Dubuque, Iowa; and Canton, Miss.

The work of raising grades between Mounds and Cairo Junction, Ill., is in progress, and when completed will bring the track from Mounds south to the Ohio River bridge approach above any probable high water.

4,061 linear feet of permanent bridges and trestles were constructed, replacing timber and pile bridges, trestles and embankments.

2,133 linear feet of permanent bridges and trestles were rebuilt or replaced by embankment.

10,411 linear feet of timber and pile bridges and trestles were rebuilt or replaced by embankment.

EQUIPMENT: One hundred and thirty-six locomotives, consisting of fifty Mikado type freight locomotives, forty-five Pacific type passenger locomotives, and forty-one switching locomotives, were added during the year, and one hundred and thirty-four light locomotives were disposed of under lease with provision for sale, resulting in an increase of two locomotives with an increase of 1,142 tons in tractive efficiency.

One hundred and seventeen passenger train cars were added during the year, and ten cars were vacated or transferred to other service, a net increase of one hundred and seven cars.

Two thousand six hundred and eighty-eight freight train cars were added during the year, and one thousand four hundred and twenty-four cars

were sold, destroyed, or transferred to work service, a net increase of one thousand two hundred and sixty-four cars. The cars retired from service were old and of light capacity. The average capacity of cars owned at the close of the year was 40.24 tons compared with 39.57 tons last year, and the total capacity of cars was 2,266,490 tons, compared with 2,180,635 tons last year.

Of an order for two thousand five hundred fifty-ton steel gondola cars contracted for delivery in the month of March of the current year, one hundred and thirteen had been delivered up to the close of the fiscal year; but they are now coming forward regularly, and it is expected that all will be delivered before the end of November, 1913.

GENERAL REMARKS.

On July 1, 1912, your Company owned a number of Central of Georgia Railway Company's First, Second and Third Preference Income Bonds, and as a part of the financing by that Company, the income bonds were sold to it and your Company in turn purchased \$15,000,000 of Central of Georgia Railway Company's Six Per Cent Cumulative Preferred Stock. In liquidating the indebtedness incurred in the purchase of the above mentioned Income Bonds, your Company issued \$15,000,000 of Four and One-half Per Cent Secured Gold Notes due July 1st, 1914, pledging as collateral security for the issue the \$15,000,000 of Central of Georgia Cumulative Preferred Stock so purchased and \$4,998,500.00 of Common Stock already owned.

The past year has not been a favorable one for the issuance of long term securities; and as your Company, in carrying out the plan of adding to its equipment, desired to purchase a considerable number of large locomotives and freight cars, as well as additional new steel passenger train cars, it was considered desirable to purchase the equipment under an equipment lease. Under date of February 1st, 1913, equipment trust certificates aggregating \$8,000,000 were issued under lease and agreement known as "Illinois Central Equipment Trust, Series A," and were sold to provide in part for funds with which to pay for one hundred and thirty-five locomotives, five thousand five hundred and thirty freight train cars, and one hundred and five passenger train cars. A considerable portion of this equipment has been received during the fiscal year; but, for such as has not yet been turned over to your Company by the builders, funds with which to make payments are in the hands of the trustee of the equipment trust.

Along with a number of other railroads in the middle south, your Company suffered severely from the floods, and on March 29th, 1913, the line to the South, across the Evansville Bridge, was washed out and remained out of commission until April 12th. At the time of this occurrence it was

not thought that the water would reach such a height as to interrupt traffic on your line between Mounds and the Cairo Bridge approach; but, notwithstanding the efforts made to prevent it, the line was washed out early in the morning of April 2nd for a distance of eighteen hundred and seventy-two feet and was impassable for traffic of any description until late in the day on April 10th, when a train was moved over a single track which had been restored, but not until several days later was it possible to move traffic to any considerable extent over this portion of the line. During this entire period the Evansville Line was washed out and all communication between the North and South over your Company's lines was stopped.

The result of this interruption of traffic was not only the loss of considerable revenue, but it also caused a large expenditure in restoring the portions of the railroad washed out, and resulted in a congestion of traffic which was a very expensive and disturbing matter to both the Company and its patrons.

Arrangements are now in progress to raise the line of railroad between Mounds and Cairo Junction, Ill., to such a height as, it is confidently expected, will in the future render the road immune from the ravages of floods at this important point.

While the income account shows that the operating results for the year considerably improved over those for the previous year, they are not equal to what had been hoped for; but month by month improvement has been made and the results for the last few months of the fiscal year were decidedly encouraging, the net revenue for the month of May being larger than that in any other month of May in the history of the Company, and that for the month of June closely approaching the highest net revenue in any previous June.

The directors of your Company concluded that under the unusual conditions of the last two years, not only those affecting general business but also those bearing especially hard on your Company, it was wise to declare a dividend of two and a half per cent upon the capital stock for the second six months of the fiscal year, making six per cent for the year. This was fully earned.

The number of stockholders June 30th, 1913, was 10,545, compared with 9,987 on the same date the previous year.

Four hundred and sixteen pensioners were carried on the rolls on June 30th, 1913. Pensions amounting to \$104,715.73 were paid during the fiscal year.

The fidelity and efficient services of the officers and employees are gratefully acknowledged by the Board.

By order of the Board of Directors.

C. H. MARKHAM,
President.

CHICAGO AND NORTH WESTERN RAILWAY COMPANY.

REPORT OF THE BOARD OF DIRECTORS.

To the Stockholders of the Chicago and North Western Railway Company:
The Board of Directors submit herewith their report of the operations and affairs of the Chicago and North Western Railway Company for the fiscal year ending June 30, 1913.

Average number of miles operated, 7,974.24.

OPERATING REVENUES:

Freight Revenue	\$54,661,588.23
Passenger Revenue	20,557,623.25
Other Transportation Revenue	7,092,311.41
Nontransportation Revenue	724,398.19

Total Operating Revenues	\$83,035,921.08
OPERATING EXPENSES (70.15 per cent. of Operating Revenues)	58,252,780.22

Net Revenue—Rail Operations	\$24,783,140.86
OUTSIDE OPERATIONS—Net Revenue	11,296.35

Net Railway Operating Revenue	\$24,794,437.21
RAILWAY TAX ACCRUALS (4.33 per cent. of Operating Revenues)	3,597,159.80

Railway Operating Income	\$21,197,277.41
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OTHER INCOME:	
Rental Income	191,209.04
Dividend Income	1,836,922.00
Income from Funded Securities	53,433.33
Income from Unfunded Securities and Accounts, and Other Items	1,381,927.54

Total Other Income	3,463,491.91
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GROSS INCOME	\$24,660,769.32
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DEDUCTIONS FROM GROSS INCOME:	
Rental Payments	\$1,194,268.52
Interest Deductions for Funded Debt	8,529,266.49
Other Deductions	62,220.84

Total Deductions	9,785,755.85
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Net Income	\$14,875,013.47
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DISPOSITION OF NET INCOME:

Sinking Funds	\$ 199,990.75
Dividends:	
8% on Preferred Stock	1,791,600.00
7% on Common Stock	9,108,015.00

Total	11,099,605.75
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Balance Income for the year	\$ 3,775,407.72
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The results as compared with the preceding fiscal year were as follows:

Freight Revenue increased	\$7,970,047.82
Passenger Revenue increased	1,002,056.10
Other Transportation Revenue increased	317,055.07
Nontransportation Revenue increased	48,170.51

Total Operating Revenues increased	\$9,337,329.50
Operating Expenses increased	\$5,550,936.92

Railway Tax Accruals increased	174,321.67
Operating Expenses and Railway Tax Accruals increased	\$5,725,258.59

Net Revenue from Outside Operations increased	44,334.94
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5,680,923.65

Railway Operating Income increased \$3,656,405.85

Of the Operating Expenses for the current fiscal year \$32,911,995.31, or 56.50 per cent., was paid employees for Labor, as compared with \$30,350,692.09, or 57.59 per cent., paid during the preceding fiscal year. The increase of \$2,561,303.22 in the amount paid is accounted for as follows:

Increase account higher rates of compensation \$495,896.16

Increase account more time worked 2,065,407.06

\$2,561,303.22

MILES OF RAILROAD.

The total number of miles of railroad owned June 30, 1913, was 7,830.86 miles

In addition to which the company operated:

THROUGH OWNERSHIP OF ENTIRE CAPITAL STOCK—
Wolf River Valley Railway (Junction east of Elton to Van Ostrand, Wis.) 1.98 "

UNDER LEASE—
De Pue, Ladd & Eastern Railroad (Ladd to Seatonville, Ill.) 3.25 miles

Belle Fourche Valley Railway (Belle Fourche to Newell, S. D.) 23.52 "

James River Valley and North Western Railway (Blunt to Gettysburg, S. D.) 39.55 "

66.32 "

UNDER TRACKAGE RIGHTS—
Peoria & Pekin Union Railway (in the city of Peoria, Ill.) 2.02 "

Chicago, Indiana & Southern Railroad (Churchill to Ladd, Ill.) 2.80 "

Union Pacific Railroad (Broadway Station, Council Bluffs, Iowa, to South Omaha, Neb.) 8.73 "

Missouri Valley and Blair Railway and Bridge Company's track 3.36 "

Chicago, St. Paul, Minneapolis & Omaha Railway (Blair to Omaha, Neb.) 24.70 "

Chicago, St. Paul, Minneapolis & Omaha Railway (Elroy to Wyeville, Wis.) 22.79 "

Chicago, St. Paul, Minneapolis & Omaha Railway (in Sioux City, Iowa) 2.28 "

Illinois Central Railroad (Sioux City to Wren, Iowa) 10.10 "

76.78 "

Total miles of railroad operated June 30, 1913. 7,975.94 "

The above mileage is located as follows:

In Illinois 705.53 miles

2,170.03 "

In Wisconsin 519.88 "

650.30 "

In Michigan 1,620.26 "

14.28 "

In Iowa 1,063.15 "

1,102.05 "

In Nebraska 130.40 "

7,975.94 "

Total 7,975.94 "

FREIGHT TRAFFIC.

The details of Freight Traffic for the year ending June 30, 1913, compared with the preceding year, were as follows:

	1912.	1913.	Amount.	Per Cent.	INCREASE
FREIGHT REVENUE	\$46,691,540.41	\$54,661,588.23	\$7,970,047.82	17.07	
TONS OF FREIGHT CARRIED	37,265,642	44,839,071	20.32	Increase	
TONS OF FREIGHT CARRIED ONE MILE	5,146,634,307	6,282,916,222	22.08	Increase	
AVERAGE REVENUE RECEIVED PER TON	\$1.25	\$1.22	2.40	Decrease	
AVERAGE REVENUE RECEIVED PER TON PER MILE	.91 of a cent	.87 of a cent	4.40	Decrease	
AVERAGE DISTANCE EACH TON WAS HAULED	138.11 miles	140.12 miles	1.46	Increase	
MILEAGE OF REVENUE FREIGHT AND MIXED TRAINS	17,216,183	18,055,815	4.88	Increase	
AVERAGE NUMBER OF TONS OF REVENUE FREIGHT CARRIED PER TRAIN MILE					
East of Missouri River	324.36	375.38	15.73	Increase	
West of Missouri River	136.93	148.68	8.58	Increase	
Whole Road	298.94	347.97	16.40	Increase	
AVERAGE NUMBER OF TONS OF REVENUE FREIGHT CARRIED PER LOADED CAR MILE	16.87	18.38	8.95	Increase	
AVERAGE FREIGHT REVENUE PER TRAIN MILE	\$2.71	\$3.03	11.81	Increase	

PASSENGER TRAFFIC.

The details of Passenger Traffic for the year ending June 30, 1913, compared with the preceding year, were as follows:

	1912.	1913.	Amount.	Per Cent.	INCREASE
PASSENGER REVENUE	\$19,555,567.15	\$20,557,623.25	\$1,002,056.10	5.12	
PASSENGERS CARRIED	31,526,803	32,441,450	2.90	Increase	
PASSENGERS CARRIED ONE MILE	1,080,580,440	1,113,831,352	3.08	Increase	
AVERAGE FARE PAID PER PASSENGER	62 cents	63 cents	1.61	Increase	
AVERAGE RATE PAID PER PASSENGER PER MILE	1.81 cents	1.85 cents	2.21	Increase	
AVERAGE DISTANCE TRAVELED PER PASSENGER	34.28 miles	34.33 miles	.15	Increase	
MILEAGE OF REVENUE PASSENGER AND MIXED TRAINS	21,232,249	21,378,704	.69	Increase	
AVERAGE PASSENGER-TRAIN REVENUE PER TRAIN MILE	\$1.17	\$1.23	5.13	Increase	

MAINTENANCE OF WAY AND STRUCTURES.

The total Operating Expenses of the Company for the year ending June 30, 1913, were \$58,252,780.22; of this amount \$11,501,186.43 was for charges pertaining to the Maintenance of Way and Structures. Included in these charges is a large part of the cost of 79,495 tons of steel rails, the greater portion of which was laid in replacement of rails of lighter weight in 559.00 miles of track; also the cost of 2,717,525 new ties.

The charges for Maintenance of Way and Structures also include a portion of the cost of ballasting 143.16 miles of track with crushed stone, 92.69 miles with gravel, and 15.73 miles with cinders; the erection, in place of wooden structures, of 29 new steel bridges on masonry, and 5 on pile supports, aggregating 3,070 feet in length and containing 2,655 tons of bridge metal; and the replacement of other wooden structures with masonry arch and box culverts and cast-iron pipes, the openings being filled with earth. The wooden structures replaced by permanent work aggregate 6,243 feet in length.

The charges on account of Maintenance of Way and Structures for the year ending June 30, 1913, compared with the preceding year, were as follows:

	1912.	1913.	Increase or Decrease.
COST OF RAILS:			
New steel rails	\$684,098.02	\$1,608,212.85	\$924,114.83 Inc.
Usable and re-rolled rails	517,029.13	589,407.15	72,378.02 Inc.
	\$1,201,127.15	\$2,197,620.00	\$996,492.85 Inc.
Less value of old rails and other items	858,802.36	1,582,238.40	723,436.04 Inc.
Net charge for rails	\$342,324.79	\$615,381.60	\$273,056.81 Inc.
COST OF TIRES	1,089,639.61	1,398,359.45	308,719.84 Inc.
COST OF BALLAST	270,889.41	193,644.46	77,244.95 Dec.
COST OF OTHER TRACK MATERIAL	332,143.11	525,805.53	193,662.42 Inc.
ROADWAY AND TRACK LABOR AND OTHER EXPENSES	3,971,729.48	4,949,338.52	977,609.04 Inc.

Total Charges for Roadway and Track

Other Charges Account Maintenance of Way and Structures were as follows:

BRIDGES, TRESTLES AND CULVERTS	982,706.24	854,794.52	127,911.72 Dec.
ROAD CROSSINGS, FENCES, ETC.	228,930.65	325,226.84	96,296.19 Inc.
SIGNALS AND INTERLOCKING PLANTS	314,857.72	444,175.32	129,317.60 Inc.
BUILDINGS, FIXTURES AND GROUNDS	977,028.80	1,175,886.10	198,857.30 Inc.
DOCKS AND WHARVES	130,497.71	214,950.50	84,452.79 Inc.
SUPERINTENDENCE	463,546.88	483,468.65	19,921.77 Inc.
ROADWAY TOOLS AND SUPPLIES	92,885.00	139,863.67	46,978.67 Inc.
SUNDAY MISCELLANEOUS CHARGES	171,541.79	180,291.27	8,749.48 Inc.

Total Charges Account Maintenance of Way and Structures

..... \$9,368,721.19 \$11,501,186.43 \$2,132,465.24 Inc. The above charges for Maintenance of Way and Structures for the current year amount to 19.74 per cent. of the total Operating Expenses, as compared with 17.78 per cent. for the preceding fiscal year.

MAINTENANCE OF EQUIPMENT.

The charges on account of Maintenance of Equipment for the year ending June 30, 1913, compared with the preceding year, were as follows:

	1912.	1913.	Increase or Decrease.
LOCOMOTIVES	\$4,167,982.40	\$4,688,207.05	\$520,224.65 Inc.
PASSENGER-TRAIN CARS	907,629.77	1,088,442.20	180,812.43 Inc.
Freight-Train Cars	3,764,638.33	5,016,122.00	1,251,483.67 Inc.
WORK EQUIPMENT	99,451.93	132,975.41	33,523.48 Inc.
SHOP MACHINERY AND TOOLS	241,971.21	229,505.27	12,465.94 Dec.
SUPERINTENDENCE	310,815.69	335,106.49	24,290.80 Inc.
SUNDAY MISCELLANEOUS CHARGES	77,363.82	78,137.67	773.85 Inc.

Total Charges Account Maintenance of Equipment..... \$9,569,853.15 \$11,568,496.09 \$1,998,642.94 Inc. The above charges for Maintenance of Equipment for the current year amount to 19.80 per cent. of the total Operating Expenses, as compared with 18.16 per cent. for the preceding fiscal year.

RESERVE FOR ACCRUED DEPRECIATION ON EQUIPMENT.

At the close of the preceding fiscal year there was a balance to the credit of the Equipment Reserve Accounts of..... \$3,375,862.22 During the year ending June 30, 1913, there was credited to the Equipment Reserve Accounts on account of charges to Operating Expenses and Profit and Loss, and for salvage.... 3,558,807.62

..... \$6,934,669.84

And there has been charged during the year against the above amount the original cost of Equipment retired and other items, as follows:

49 Locomotives	\$413,117.15
14 Passenger-Train Cars	68,984.78
2,242 Freight-Train Cars	1,306,815.95
186 Work Equipment Cars	40,444.80
Other Items	439,594.88

..... 2,268,957.56

Leaving a balance to the credit of the Equipment Reserve Accounts on June 30, 1913, of..... \$4,665,712.28

TRANSPORTATION EXPENSES.

The Transportation Expenses of the Company for the year ending June 30, 1913, were \$32,241,257.68, or 55.35 per cent. of the total Operating Expenses. Of this amount \$19,626,078.01, or 60.87 per cent., was charged for labor; \$7,925,888.13, or 24.58 per cent., was charged for fuel for locomotives; and \$4,689,291.54, or 14.55 per cent., was charged for supplies and miscellaneous items. The increase in the Transportation Expenses for the year ending June 30, 1913, as compared with the preceding fiscal year, was \$1,316,319.38, or 4.26 per cent., distributed as follows:

Increase in amount charged for labor	\$834,691.79
Increase in amount charged for fuel for locomotives	264,620.51
Increase in amount charged for supplies and miscellaneous items	217,007.08
items	

..... \$1,316,319.38

CAPITAL STOCK.

There was no change during the year in the Capital Stock and Scrip of the Company other than the purchase by the Company of \$75.00 Common Stock Scrip.

The Company's authorized Capital Stock is Two Hundred Million Dollars (\$200,000,000.00), of which the following has been issued to June 30, 1913:

Common Stock and Scrip held by the public	\$130,117,028.82
Common Stock and Scrip owned by the Company	2,338,502.15

Total Common Stock and Scrip	\$132,455,530.97
Preferred Stock and Scrip held by the Public	\$22,395,120.00
Preferred Stock and Scrip owned by the Company	3,834.56

FUNDED DEBT.

At the close of the preceding fiscal year the amount of Bonds held by the Public and in Sinking Funds was..... \$184,079,000.00

The above amount has been decreased during the year ending June 30, 1913, as follows:

..... \$183,939,000.00

And the above amount has been increased by Equipment Trust Certificates sold and Bonds assumed during the year, as follows:

..... 9,320,000.00

BONDS IN THE TREASURY AND DUE FROM TRUSTEE.

At the close of the preceding fiscal year the amount of the Company's Bonds in its Treasury and due from Trustee was \$6,381,000.00.

The above amount has been increased during the year ending June 30, 1913, as follows:

C. & N. W. Ry. GENERAL MORTGAGE GOLD BONDS OF 1987, DUE FROM TRUSTEE IN EXCHANGE FOR BONDS RETIRED, VIZ.:

C. & N. W. Ry. Sinking Fund of 1879, 6%.. \$52,000.00

C. & N. W. Ry. Sinking Fund of 1879, 5%.. 86,000.00

\$138,000.00

C. & N. W. Ry. GENERAL MORTGAGE GOLD BONDS OF 1987, DUE FROM TRUSTEE ON ACCOUNT OF CONSTRUCTION EXPENDITURES MADE DURING THE YEAR

1,000,000.00

1,138,000.00

Total Bonds in the Treasury and due from Trustee, June 30, 1913

\$7,519,000.00

Net Increase during the year in Bonds in the Treasury and due from Trustee

\$1,138,000.00

CONSTRUCTION.

The construction charges for the year ending June 30, 1913, were as follows:

ON ACCOUNT OF ELEVATING TRACKS, VIZ.:

North 46th Avenue to Austin Avenue, Chicago, Ill.	\$200.57
Austin Avenue to Harlem Avenue, Oak Park, Ill.	10,263.15
Harlem Avenue, Oak Park, Ill., to Des Plaines River	80,187.10
South Branch Track, from near Taylor Street to Canal Street, Chicago, Ill.	1,416.39

\$92,067.21

SUNDAY CONSTRUCTION:

Right of Way and Additional Depot and Yard Grounds	\$124,051.13
Buildings and Fixtures	519,900.76
Docks and Wharves	59,004.85
Shop Machinery and Tools	62,215.60
Bridges, Trestles and Culverts	570,675.28
Interlocking and Signal Apparatus	345,202.66
Telephone Lines	110,802.09
New Sidings, Yard Tracks and Spurs to Industries	53,556.49
Betterment of Roadway and Track	1,110,201.00
Proviso, Ill., Terminal Improvements	148,236.03
Proviso, Ill., Overhead Highway Crossing	105,771.00
Miscellaneous Construction, including Road Crossings, Fences and other items	246,216.75

3,455,833.64

EQUIPMENT:

1 Locomotive, 251 Freight-Train Cars, and 82 Work Equipment Cars	\$321,419.14
Improvement of Equipment	231,010.16
Trust Equipment of 1912 added:	
75 Locomotives, 55 Steel Passenger-Train Cars and 4,910 Freight-Train Cars	6,000,140.45

\$6,552,569.75

Less Equipment retired

2,268,957.56

4,283,612.19

\$7,831,513.04

Account Cost of Milwaukee, Sparta and North Western Railway

587,801.05

Account Cost of Des Plaines Valley Railway

2,498,669.45

Cost of St. Paul Eastern Grand Trunk Railway

1,120,600.00

\$12,038,583.54

SUNDAY ADDITIONS AND BETTERMENTS.

Among the more important sundry additions and betterments to the property of the Company during the fiscal year are the following:

An aggregate of 54.00 miles of yard tracks, sidings and industrial spurs has been added.

To provide for additional yard tracks, the Company has acquired during the year approximately 60 acres of land adjoining its right of way north of and near Waukegan, Illinois, and approximately 186 acres of land adjoining its right of way near Kenosha, Wisconsin.

At the Chicago Passenger Terminal an unfinished space under the train shed, approximately 200 feet by 280 feet, has been utilized in providing sanitary and convenient quarters for the Dining Car Department.

At Chicago Avenue, Chicago, a brick power house, 38 feet by 85 feet, has been constructed and the engine house enlarged sufficiently to accommodate the Company's largest type of locomotive.

At the Chicago Shops a modern hot water boiler washout system has been installed in a new building constructed for that purpose, and a building 40 feet by 176 feet has been constructed in which machinery will be installed for reclaiming usable material.

At Proviso, Illinois, an overhead bridge, approximately 3,000 feet in length, including approaches, has been constructed at the Wolf Road crossing to permit highway traffic to pass over this Company's freight terminal yards.

At West Chicago, Illinois, a modern brick passenger station has been completed and important additions and alterations have been made in yard and track facilities. The building formerly used as a passenger station has been moved to a new location for use as a freight station. An overhead highway bridge connecting Parker Avenue and Depot Street has been constructed and the construction of an overhead highway bridge extending Maple Avenue across the Company's tracks is in progress.

At Evansville, Wisconsin, and at Waseca, Minnesota, modern brick passenger stations have been completed.

At Clinton, Iowa, a 425-foot extension to the Company's ice house has been constructed, the icing platform has been changed from single to double deck and equipped with conveyors. Electric power for the operation of machinery has been installed.

At Clinton, Iowa, there are also under construction a 9-stall engine machine shop, an 8-stall engine machine shop, power house, store and office building and an engineers' and firemen's building which it is expected will be completed during the present calendar year.

At Council Bluffs, Iowa, a brick freight house 258 feet by 40 feet, brick office building 33 feet by 35 feet, boiler house, machinery and transfer platforms and necessary track changes have been completed.

At Omaha, Nebraska, this Company has, jointly with the Chicago, Saint Paul, Minneapolis and Omaha Railway Company, constructed a 15-stall brick engine house, a machine shop 50 feet by 140 feet, an oil house, and installed an 80-foot turntable.

At Milwaukee, Wisconsin, a two-story brick freight house 50 feet by 360 feet has been constructed on land recently acquired by this Company on the east side of Van Buren Street.

At Green Bay, Wisconsin, a 40-stall brick engine house, power house, store and oil house, cinder pit, turntable, coal and water station and ice house, including necessary trackage, are under construction.

At Ashland, Wisconsin, Ore Dock No. 1 has been partially rebuilt and its total capacity materially increased.

In extending the use of oil as a locomotive fuel on the Company's Nebraska and Wyoming lines, 81 additional locomotives have been equipped with oil burners; 70 additional tank cars have been purchased, and plants for the storage of fuel oil have been installed at 13 stations during the year.

Thus far 113 locomotives have been equipped with oil burners, 95 tank cars have been acquired and 16 storage tanks installed. Pumps and pump-houses have been constructed at various stations west of the Missouri River and warming sheds have been constructed at Chadron, Nebraska, and Casper, Wyoming.

In complying with statutes enacted by the Legislatures of Wisconsin, Michigan, Minnesota, Iowa and South Dakota, a considerable expenditure has been made during the year for equipping locomotives with electric headlights.

The installation of automatic block signals between Harvard, Illinois, and Evansville, Wisconsin, a distance of 44 miles, and between Madison and Baraboo, Wisconsin, a distance of 38 miles, has been completed during the year and automatic block signals are being installed between Evansville and Madison, Wisconsin, a distance of 22.5 miles, and between Baraboo and Elroy, Wisconsin, a distance of 37.3 miles. Upon the completion of the work now in progress 957 miles of the Company's railway will be protected by automatic signals.

A telephone line for use in dispatching trains has been completed during the year from Chicago, Illinois, to Clinton, Iowa, a distance of 138 miles, which provides a continuous telephone line from Chicago to Council Bluffs. Telephone lines for like use are being installed from Nelson to Peoria, Illinois, a distance of 81.9 miles; Huron, South Dakota, to Hawarden, Iowa, a distance of 144.3 miles; and from Centerville to Yankton, South Dakota, a distance of 28.5 miles. Upon the completion of these lines the Company will have in operation 2,172.7 miles of telephone lines for use in dispatching trains.

NEW RAILWAYS.

The DES PLAINES VALLEY RAILWAY, a double track outer belt railway, constructed in the interest of this Company, from the Proviso Yard on the Galena Division to a point between Northfield and Blodgett, Illinois, on the Wisconsin Division, a distance of 20.51 miles, has been completed. This railway was purchased and its indebtedness, consisting of \$2,500,000 First Mortgage 4 1/2% Gold Bonds, payable March 1, 1947, was assumed by this Company on March 1, 1913.

The ST. PAUL EASTERN GRAND TRUNK RAILWAY, a proprietary railway, approximately 60.02 miles in length, extending from Clintonville to Oconto, Wisconsin, formerly operated by this Company under lease, was purchased and its indebtedness, consisting of \$1,120,000 First Mortgage 4 1/2% Gold Bonds, payable January 1, 1947, was assumed by this Company on March 1, 1913.

The ST. LOUIS, PEORIA AND NORTH WESTERN RAILWAY, under construction in the interest of this Company from near Peoria to near Girard, Illinois, a distance of 90.6 miles, is nearly completed. On June 18, 1913, the St. Louis, Peoria and North Western Railway Company acquired by purchase the Macoupin County Railway, a proprietary railway, extending from near Girard to the Company's coal fields in Macoupin County, Illinois, a distance of 23.9 miles.

The MACOUPIN COUNTY EXTENSION RAILWAY COMPANY was organized in the interest of this Company in May, 1913, to construct a railway from a connection with the Macoupin County Railway, near Beld, in a general southerly direction for a distance of about nine miles to reach certain coal fields under development in Macoupin and Madison Counties, Illinois.

The IOWA SOUTHERN RAILWAY COMPANY was organized in the interest of this Company in January, 1913, to construct a railway from a connection with this Company's railway in Monroe County, Iowa, in a general southwesterly direction in that County for a distance of about 25 miles. Approximately 13 miles of this railway are now under construction.

EQUIPMENT TRUST OF 1912.

The following equipment acquired pursuant to the agreement establishing the Chicago and North Western Railway Company Equipment Trust of 1912, to which reference was made in the last annual report, has been delivered and leased by this Company from The Farmers' Loan and Trust Company and Edwin S. Marston, Trustees, and the plates, or insignia of ownership, required by the agreement, have been attached thereto during the year:

SERIES A:

75 locomotives,
55 steel, passenger-train cars,
483 refrigerator cars,
500 flat cars,
257 box cars.

SERIES B:

517 refrigerator cars,
3,153 box cars.

The following Equipment Trust Certificates, bearing interest at the rate of 4 1/4% per annum, issued by The Farmers' Loan and Trust Company, Trustee, on account of the foregoing equipment have been sold during the year:

SERIES A:

Certificates dated July 1, 1912, maturing at the rate of \$300,000 per annum on July 1, 1914, to July 1, 1922, inclusive

NOTE.—The certificates maturing July 1, 1913, aggregating \$300,000, were not sold.

SERIES B:

Certificates dated October 1, 1912, maturing at the rate of \$300,000 per annum on October 1, 1913, to October 1, 1922, inclusive.....

\$5,700,000

Contracts have been made by the Vendors under the Equipment Trust of 1912 for the following equipment to be included in Series C of that Trust, which will complete the acquisition of equipment under the Equipment Trust Agreement of 1912:

4 locomotives,
2,000 gondola cars,
2,005 box cars.

Upon the delivery of this equipment, which is nearly completed, it will be conveyed by the Vendors to the Trustees and leased by this Company and thereupon Equipment Trust Certificates, Series C, will be issued pursuant to the agreement, in an amount not exceeding the cost of the equipment.

EQUIPMENT TRUST OF 1913

To make further provision for the acquisition of additional equipment, an agreement, sanctioned by the Board of Directors, and identical in terms with the agreement establishing the Equipment Trust of 1912, was entered into by this Company with the same Trustees and Vendors, on January 20, 1913, establishing the Chicago and North Western Railway Company Equipment Trust of 1913, under which provision has been made for the issuance of Equipment Trust Certificates to an amount not to exceed the cost of the equipment acquired thereunder and in no event to exceed \$10,000,000.

Contracts have been made by the Vendors for the following equipment which will be included in the first series of this Trust, to be known as Series D, the delivery of which is nearly completed:

71 locomotives,
68 steel, passenger-train cars,
495 box cars,
1,000 ore cars,
500 flat cars,
40 caboose cars.

LANDS.

During the year ending June 30, 1913, 19,609.26 acres and 75 town lots

of the Company's Land Grant lands have been sold for the total consideration of \$578,775.59. The total number of acres remaining in the several Grants June 30, 1913, amounted to 355,293.56 acres, of which 34,677.34 acres were under contract for sale, leaving unsold 320,616.22 acres.

A tract of land fronting on the Calumet River south of 118th Street in Chicago, containing approximately 116 acres, has been acquired by the Company during the year. This land is adjacent to tracks controlled by the Indiana Harbor Belt Railroad Company, in which railway this Company has acquired a substantial interest. This acquisition will provide a location for facilities needed by the Chicago and North Western Railway Company in that district. The expenditure on this account is temporarily carried on the Company's Balance Sheet in "Deferred Debit Items."

An agreement sanctioned by the Board of Directors, was entered into on April 10, 1913, with the City of Milwaukee, by the terms of which this Company acquired the right to fill in, and occupy with additional tracks, approximately ten acres of submerged lands east of its present holdings on the shore of Lake Michigan in that City, in exchange for its riparian rights and approximately eight acres of certain accreted land north of Juneau Park. The agreement also establishes the boundary line between the holdings of this Company and those of the City on the lake front.

Appended hereto may be found statements, accounts and statistics relating to the business of the fiscal year, and the condition of the Company's affairs on June 30, 1913.

By order of the Board of Directors.

WILLIAM A. GARDNER,
President.

GENERAL BALANCE SHEET, JUNE 30, 1913.

(7,830.86 Miles.)

ASSETS.

PROPERTY INVESTMENT:

Road and Equipment—
Balance to Debit of this Account, June
30, 1912 \$324,616,664.76
Add Sundry Construction and Equipment
Expenditures for the year ending
June 30, 1913 (including trust
equipment), as see statement else-
where herein 7,831,513.04
" Account Cost of Milwaukee, Sparta
and North Western Railway 587,801.05
" Account Cost of Des Plaines Val-
ley Railway 2,498,669.45
" Cost of St. Paul Eastern Grand
Trunk Railway 1,120,600.00

..... \$336,655,248.30

Securities—
Securities of Proprietary, Affiliated and Controlled
Companies—Unpledged 1,492,013.15
Other Investments—
Advances to Proprietary, Affiliated and
Controlled Companies for Construc-
tion, Equipment and Betterments.... \$17,831,122.13
Miscellaneous Investments 939,425.23

..... 18,770,547.36

..... \$356,917,808.81

WORKING ASSETS:

Cash \$9,647,251.88
Common Stock and Scrip, C. & N. W.
Ry. Co., in hands of Treasurer 2,338,502.15
Preferred Stock and Scrip, C. & N. W.
Ry. Co., in hands of Treasurer 3,834.56
\$ 40,000 M. L. S. & W. Ry. Ext. & Imp.
Sinking Fund Bonds on hand 40,000.00
7,048,000 C. & N. W. Ry. General Mort-
gage Gold Bonds of 1987, due
from Trustee 7,048,000.00
431,000 Southern Iowa Ry. First Mort-
gage Bonds on hand 431,000.00
149,200 Shares of Capital Stock of the
Chicago, St. Paul, Minneapolis
& Omaha Ry. Co. 10,337,152.29
41,715 Shares of Preferred Stock of the
Union Pacific Railroad Co. 3,910,575.93
Bills Receivable 569,251.00
Traffic and Car-Service Balances Due from
Other Companies 118,532.09
Net Balance Due from Agents and Con-
ductors 3,106,836.61
Miscellaneous Accounts Receivable 2,398,474.47
Materials and Supplies 6,014,827.68
Other Working Assets 225,014.79

..... 46,189,253.45

..... 10,481,784.55

..... \$413,588,846.81

DEFERRED DEBIT ITEMS:

Advances \$4,598,412.73
Insurance Paid in Advance 31,311.72
Cash and Securities in Sinking and Re-
demption Funds 3,976,922.16
Other Deferred Debit Items 1,875,137.94

..... 10,481,784.55

..... \$413,588,846.81

LIABILITIES.

CAPITAL STOCK:

Common Stock and Scrip, C. & N. W. Ry. Co., held by the Public.....	\$130,117,028.82
Preferred Stock and Scrip, C. & N. W. Ry. Co., held by the Public.....	22,395,120.00
Common Stock and Scrip, C. & N. W. Ry. Co., owned by the Company.....	\$2,338,502.15
Preferred Stock and Scrip, C. & N. W. Ry. Co., owned by the Company.....	3,834.56
Premium Realized on Capital Stock.....	2,342,336.71
	29,657.75
	\$154,884,143.28

MORTGAGE, BONDED AND SECURED DEBT:

Bonds in hands of the Public.....	\$174,804,500.00
Equipment Trust Certificates in hands of the Public.....	5,700,000.00
C. & N. W. Ry. Sinking Fund Debentures of 1933, in hands of the Public, issued for purchase of Stock of C. St. P. M. & O. Ry. Co.....	9,695,000.00
	\$190,199,500.00
Bonds held by Trustee account Sinking Funds.....	3,059,500.00
Bonds owned by the Company and due from Trustee.....	7,519,000.00
	200,778,000.00

WORKING LIABILITIES:

Traffic and Car-Service Balances Due to Other Companies.....	\$1,661,242.38
Audited Vouchers and Wages Unpaid.....	5,244,791.28
Miscellaneous Accounts Payable.....	171,313.96
Matured Interest, Dividends and Rents Unpaid.....	3,101,004.54
Other Working Liabilities.....	241,391.09
	10,419,743.25

ACCRUED LIABILITIES NOT DUE:

Unmatured Interest Payable.....	\$1,930,783.35
Taxes Accrued.....	60,000.00
	1,990,783.35

DEFERRED CREDIT ITEMS:

Reserve for Accrued Depreciation on Equipment.....	\$4,665,712.28
Other Deferred Credit Items.....	435,671.26
	5,101,383.54

APPROPRIATED SURPLUS:

Sinking Fund on Madison Extension Gold Bonds.....	\$67,543.86
" " " Menominee Extension Gold Bonds.....	112,270.49
" " " North Western Union Ry. Gold Bonds.....	1,520,893.41
" " " W. & St. P. R. R. Ex- tension Gold Bonds.....	2,275,341.27
	3,976,049.03
PROFIT AND LOSS.....	36,438,744.36
	\$413,588,846.81

PROFIT AND LOSS ACCOUNT, JUNE 30, 1913.

DR.

Depreciation accrued prior to July 1, 1907, on equipment
retired or changed from one class to another during the
current fiscal year \$1,364,199.95
Net loss on property sold or abandoned and not replaced..... 380,673.56
Balance Credit, June 30, 1913, carried to Balance Sheet... 36,438,744.36

..... \$38,183,617.87

C.R.
Balance, June 30, 1912..... \$34,186,372.05
Balance Income for Year ending June 30, 1913, brought for-
ward from Income Account..... 3,775,407.72
Amount transferred from "Appropriated Surplus" on account
of the retirement of Madison Extension and Menominee
Extension First Mortgage Sinking Fund Bonds..... 199,361.07
Adjustments in sundry accounts, etc..... 22,471.03
..... \$38,183,617.87

COMPARATIVE STATEMENT OF INCOME ACCOUNT.

	Year Ending June 30, 1912.	Year Ending June 30, 1913.	Increase or Decrease.
Average Mileage Operated....	7,858.87	7,974.24	115.37
OPERATING REVENUES:			
Freight Revenue	\$46,691,540.41	\$54,661,588.23	\$7,970,047.82
Passenger Revenue	19,555,567.15	20,557,623.25	1,002,056.10
Other Transportation Revenue	6,775,256.34	7,092,311.41	317,055.07
Nontransportation Revenue	676,227.68	724,398.19	48,170.51
Total Operating Revenues.....	\$73,698,591.58	\$83,035,921.08	\$9,337,329.50
OPERATING EXPENSES.....	52,701,843.30	58,252,780.22	5,550,936.92
Net Revenue—Rail Operations	\$20,996,748.28	\$24,783,140.86	\$3,786,392.58
OUTSIDE OPERATIONS—Net Revenue	Dr. 33,038.59	11,296.35	44,334.94
Net Railway Operating Revenue	\$20,963,709.69	\$24,794,437.21	\$3,830,727.52
RAILWAY TAX ACCRUALS.....	3,422,838.13	3,597,159.80	174,321.67
Railway Operating Income.....	\$17,540,871.56	\$21,197,277.41	\$3,656,405.85
OTHER INCOME:			
Rental Income	168,884.24	191,209.04	22,324.80
Dividend Income	1,844,722.00	1,836,922.00	−7,800.00

Income from Funded Securities	5,025.00	53,433.33	48,408.33
Income from Unfunded Securities and Accounts, and Other Items	1,363,263.28	1,381,927.54	18,664.26
Total Other Income.....	\$3,381,894.52	\$3,463,491.91	\$81,597.39
GROSS INCOME	\$20,922,766.08	\$24,660,769.32	\$3,738,003.24
DEDUCTIONS FROM GROSS INCOME:			
Rental Payments	1,194,791.02	1,194,268.52	−522.50
Interest Deductions for Funded Debt	7,872,007.25	8,529,266.49	657,259.24
Other Deductions	131,427.98	62,220.84	−69,207.14
Total Deductions	\$9,198,226.25	\$9,785,755.85	\$587,529.60
Net Income	\$11,724,539.83	\$14,875,013.47	\$3,150,473.64
DISPOSITION OF NET INCOME:			
Sinking Funds	257,209.23	199,990.75	−57,218.48
Dividends:			
8% on Preferred Stock.....	1,791,600.00	1,791,600.00	.....
7% on Common Stock.....	9,108,015.00	9,108,015.00	.....
Total	\$11,156,824.23	\$11,099,605.75	−\$57,218.48
Balance Income for the year, carried to Profit and Loss	\$567,715.60	\$3,775,407.72	\$3,207,692.12

CHICAGO, SAINT PAUL, MINNEAPOLIS AND OMAHA RAILWAY COMPANY.

REPORT OF THE BOARD OF DIRECTORS.

To the Stockholders of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company:

The Board of Directors submit herewith their report of the operations and affairs of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company for the fiscal year ending June 30, 1913.

Average number of miles operated, 1,746.84

OPERATING REVENUES.

Freight revenue	\$10,857,206.93
Passenger revenue	4,984,595.31
Other transportation revenue	1,056,864.00
Non-transportation revenue	94,338.44

Total operating revenue..... \$16,993,004.68

OPERATING EXPENSES (69.95 per cent. of operating revenues). 11,887,461.28

Net operating revenue \$5,105,543.40 |

OUTSIDE OPERATIONS (net deficit)..... 4,811.62

Total net revenue..... \$5,100,731.78

RAILWAY TAX ACCRUALS (4.90 per cent. of operating revenue). 832,263.27

Railway operating income..... \$4,268,468.51

OTHER INCOME.

Rental Income	\$136,257.28
Dividend income	46,351.00
Income from funded securities.....	11,900.00
Income from unfunded securities and accounts, and other items.....	41,294.81

Total other income..... 235,803.09

Gross income \$4,504,271.60 |

DEDUCTIONS FROM GROSS INCOME.

Rental payments	\$387,159.70
Interest deductions for funded debt.....	1,826,264.05
Other deductions	11,914.54

Total deductions 2,225,338.29 |

Net income \$2,278,933.31 |

DISPOSITION OF NET INCOME.

Dividends:	
7% on preferred stock.....	\$787,976.00
7% on common stock.....	1,298,934.00

Total dividends 2,086,910.00 |

Balance income for the year..... \$192,023.31

As compared with the previous year, the results were as follows:

Freight revenue increased..... \$1,378,415.08

Passenger revenue increased..... 433,001.45

Other transportation revenue increased..... 47,640.67

Non-transportation revenues decreased..... 1,478.60

Total operating revenue increased..... \$1,857,578.60

Operating expenses increased..... \$1,421,244.79

Railway tax accruals increased..... 49,417.32

Operating expenses and railway tax accruals increased..... \$1,470,662.11

Net deficit from outside operations increased..... 78.94

Railway operating income increased..... \$386,837.55

Of the operating expenses for the current fiscal year \$6,721,181.33, or 56.54 per cent., was paid employees for labor, as compared with \$6,159,663.03, or 58.85 per cent., paid during the preceding fiscal year. The increase of \$561,518.30 in the amount paid is accounted for as follows:

Increase account higher rates of compensation..... \$ 86,062.59

Increase account more time worked..... 475,455.71

Total increase \$561,518.30 |

MILES OF RAILROAD.			
The total number of miles of railroad owned June 30, 1913, was			1,677.50 miles
In addition to which the company operated:			
Under Trackage Rights—			
Northern Pacific Railway (Superior, Wis., to Rices Point, Minn.).....		1.59 miles	
Great Northern Railway (St. Paul to Minneapolis, Minn.).....		11.40 "	
Minneapolis & St. Louis Railroad (Minneapolis to Merriam, Minn.).....		27.00 "	
Illinois Central Railroad (LeMars to Sioux City, Iowa).....		25.20 "	
Sioux City Bridge Company (bridge across Missouri River and tracks at Sioux City, Iowa).....		3.90 "	
Chicago and Northwestern Railway (Sioux City to Sioux City Bridge Company's track).....		.50 "	69.59 "
Total miles of railroad operated June 30, 1913.....			1,747.09 "
The above mileage is located as follows:			
In Wisconsin		775.42 miles	
In Minnesota		473.04 "	
In Iowa		102.04 "	
In South Dakota		85.20 "	
In Nebraska		308.39 "	
Total		1,747.09 "	
In addition to the foregoing, the company owned and operated 156.62 miles of second track, located as follows:			
In Wisconsin		130.68 miles	
In Minnesota		24.23 "	
In Nebraska		1.71 "	
Total		156.62 "	

FREIGHT TRAFFIC.			
The details of freight traffic for the year ending June 30, 1913, compared with the preceding year, were as follows:			
1912.	1913.	Amount.	Per
			Cent.
Freight revenue	\$9,478,791.85	\$10,857,206.93	\$1,378,415.08
			14.54
			Percentage of Increase or Decrease
Tons of freight carried.....	6,946,804	8,205,947	18.13 Increase
Tons of freight carried one mile	1,092,173,586	1,262,998,028	15.64 Increase
Average revenue received per ton	\$1.36	\$1.32	2.94 Decrease
Average revenue received per ton per mile .....	.87 of a cent	.86 of a cent	.92 Decrease
Average distance each ton was hauled	157.22 miles	153.91 miles	2.11 Decrease
Mileage of revenue freight and mixed trains	4,382,665	4,575,954	4.41 Increase
Average number of tons of revenue freight carried per train mile	249.20	276.01	10.76 Increase
Average number of tons of revenue freight carried per loaded car mile.....	17.62	18.99	7.78 Increase
Average freight revenue per train mile	\$2.16	\$2.37	9.72 Increase
PASSENGER TRAFFIC.			
The details of passenger traffic for the year ending June 30, 1913, compared with the preceding year, were as follows:			
1912.	1913.	Amount.	Per
			Cent.
Passenger revenue	\$4,551,593.86	\$4,984,595.31	\$433,001.45
			9.51

	1912.	1913.	Percentage of Increase or Decrease
Passengers carried	4,263,640	4,500,947	5.57 Increase
Passengers carried one mile	220,979,696	234,545,623	6.14 Increase
Average fare paid per passenger	106.75 cents	110.75 cents	3.75 Increase
Average rate paid per passenger per mile	2.060 cents	2.125 cents	3.16 Increase
Average distance traveled per passenger	51.83 miles	52.11 miles	.54 Increase
Mileage of revenue passenger and mixed trains	4,393,349	4,489,183	2.18 Increase
Average passenger train revenue per train mile	\$1.23	\$1.31	6.50 Increase

MAINTENANCE OF WAY AND STRUCTURES.

The total operating expenses of the company for the year ending June 30, 1913, were \$11,887,461.28; of this amount \$2,208,293.60 was for charges pertaining to maintenance of way and structures. Included in these charges are \$203,737.34 for rails, \$326,294.47 for ties, and the cost of re-ballasting 33,06 miles with gravel and cinders, also part cost of replacing 860 feet of wooden bridging with permanent work.

During the year 12,552 tons of new steel rails and 11,213 tons of usable and re-rolled steel rails were laid in track, a greater portion of which replaced rails of lighter weight; 631,272 ties of all descriptions were laid in renewals.

The details of the charges to maintenance of way and structures for the year, compared with the previous year, were as follows:

	1912.	1913.	Inc. or Dec.
New steel rail	\$244,835.32	\$398,243.49	\$153,408.17
Usable and re-rolled rail	138,466.60	279,678.91	141,212.31
	\$383,301.92	\$677,922.40	\$294,620.48
Less value of old rails and other items	274,466.59	474,185.06	199,718.47
Net charge for rails	\$108,835.33	\$203,737.34	\$94,902.01
COST OF TIRES	171,234.00	326,294.47	155,060.47
COST OF BALLAST	29,243.68	34,448.52	5,204.84
COST OF OTHER TRACK MATERIAL	96,879.78	99,577.84	2,698.06
ROADWAY AND TRACK LABOR AND OTHER EXPENSES	723,779.96	788,989.71	65,209.75
Total charges, Roadway and Track	\$1,129,972.75	1,453,047.88	\$23,075.13
Other Charges Account of Maintenance of Way and Structures were as follows:			
SUPERINTENDENCE	\$85,365.42	\$89,095.57	\$3,730.15
BRIDGES, TRESTLES AND CULVERTS	129,298.54	228,478.02	99,179.48
ROAD CROSSINGS, FENCES, ETC.	45,264.00	54,627.14	9,363.14
SIGNALS AND INTERLOCKING PLANTS	9,245.13	20,629.17	11,384.04
BUILDINGS, FIXTURES AND GROUNDS	170,543.05	239,467.58	68,924.53
DOCKS AND WHARVES	14,651.09	1,043.85	*13,607.24
ROADWAY TOOLS AND SUPPLIES	16,399.73	23,742.77	7,343.04
SUNDY MISCELLANEOUS CHARGES	83,988.60	98,161.62	14,173.02
Total charges, Account of Maintenance of Way and Structures	\$1,684,728.31	\$2,208,293.60	\$523,565.29

*Decrease.

The foregoing expenditures for maintenance of way and structures for the current year amount to 18.58 per cent of the total operating expenses, as compared with 16.10 per cent for the preceding fiscal year.

MAINTENANCE OF EQUIPMENT.

The charges on account of maintenance of equipment for the year ending June 30, 1913, compared with the preceding year, were as follows:

	1912.	1913.	Inc. or Dec.
Locomotives	\$783,851.05	\$902,888.58	\$119,037.53
Passenger-train cars	213,680.26	263,636.58	49,956.32
Freight-train cars	664,352.33	871,933.72	207,581.39
Work equipment	25,890.35	33,649.40	7,759.05
Shop machinery and tools	31,279.64	29,937.33	*1,342.31
Superintendence	58,462.03	59,815.81	1,353.78
Sundry miscellaneous charges	19,178.59	27,084.64	7,906.05

Total charges account of maintenance of equipment

The above charges for maintenance of equipment for the current year amount to 18.41 per cent of the total operating expenses, as compared with 17.17 per cent for the preceding fiscal year.

RESERVE FOR ACCRUED DEPRECIATION OF EQUIPMENT.

At the close of the preceding fiscal year there was a balance to the credit of the equipment reserve accounts of

During the year ending June 30, 1913, there was credited to the equipment reserve accounts on account of charges to Operating Expenses, Profit and Loss, and for Salvage

617,262.57

\$1,686,336.51

There has been charged during the year against the above amount the original cost of equipment retired as follows:

10 Locomotives	\$84,500.00
2 Passenger-train cars	8,700.00
473 Freight-train cars	270,423.52
2 Work equipment cars	1,400.00

365,023.52

Leaving a balance to the credit of the equipment reserve accounts on June 30, 1913, of

\$1,321,312.99

*Decrease.

TRANSPORTATION EXPENSES.

The transportation expenses for the year were \$6,746,791.54, or 56.76 per cent of the total operating expenses. Of this amount \$3,791,898.90, or 56.20 per cent, was for labor; \$2,026,432.05, or 30.04 per cent, was for fuel, and \$928,460.59, or 13.76 per cent, was for supplies and other items.

The total increase in the charges as compared with the previous year was \$463,523.80, distributed as follows:

Increase in amount charged for labor	\$186,665.72
Increase in amount charged for fuel for locomotives	80,836.20
Increase in amount charged for supplies and other items	196,021.88
Total increase	\$463,523.80

CAPITAL STOCK.

No stock was issued or sold during the year. The company's authorized capital stock is fifty million dollars (\$50,000,000), of which the following has been issued to June 30, 1913:

Common stock and scrip held by the public	\$18,559,086.69
Common stock and scrip in treasury	2,844,206.64
	\$21,403,293.33
Preferred stock and scrip held by the public	\$11,259,911.63

1,386,921.66

12,646,833.29

Total

\$34,050,126.62

FUNDED DEBT.

At the close of the preceding fiscal year the amount of Bonds held by the Public was

\$35,047,000.00

Debenture Gold Bonds of 1930, issued during the year for additions, improvements and equipment, were sold, amounting to

2,500,000.00

Total Bonds held by the Public June 30, 1913

\$37,547,000.00

In addition to the foregoing, Chicago, Saint Paul, Minneapolis and Omaha Railway Company Consolidated Mortgage 6% Bonds of 1880 were issued in exchange for a like amount of the following underlying bonds retired, viz.:

Chicago, Saint Paul and Minneapolis Railway First Mortgage 6% Bond of 1878	\$111,000.00
North Wisconsin Railway First Mortgage 6% Bond of 1880	31,000.00
	\$142,000.00

There was no change during the year in the amount of Bonds and Scrip in the treasury of the Company.

Total Bonds and Scrip in treasury June 30, 1913

\$51,046.02

CONSTRUCTION.

The construction charges for the year ending June 30, 1913, were as follows:

On Account of Additional Main Tracks, viz.:	
Balance cost of second track Merrillan to Weyville, Wis.	\$16,078.40
Account cost of second track Truax to Northline, Wis.	1,355,368.88
	\$1,371,447.28

On Account of Extensions, viz.:

Balance cost of new line Black River Falls to Levis, Wis.	\$1,321.11
Balance cost of double track line from Eau Claire, Wis., west	61,784.31

63,105.42

Sundry Construction:

Account cost of terminal improvements at Minneapolis, Minn.	\$524,255.52
Account cost of terminal improvements at Altoona, Wis.	43,507.92
Account cost of Earl St. viaduct, St. Paul, Minn.	16,234.67
Automatic block signals	258,244.49
Permanent bridges (cost of new over old)	70,764.32
Strengthening bridges to withstand heavy power	80,094.56
Betterments of roadway and track	155,093.27
Sidings and spur tracks	56,338.32
Terminal yards	28,880.95
Buildings	93,133.39
Machinery and tools	33,062.47
Miscellaneous charges	118,748.65
	1,478,358.53

Equipment:

Equipment acquired (23 locomotives, 2 steel baggage, 1,000 box, 500 gondola, 100 refrigerator cars, one steam wrecker and one ballast spreader)	\$1,746,896.41
Improvements to equipment	41,412.15

\$1,788,308.56

Less equipment retired

Cr. 365,023.52 1,423,285.04

Total

\$4,336,196.27

SECOND MAIN TRACK.

The work on the second track between Truax and Northline, Wis., mentioned in last year's report, is well advanced, and the greater part of the track has been laid and 29.65 miles placed in operation.

It is expected that the balance of the track will be placed in operation during the month of October, 1913.

SUNDAY ADDITIONS AND BETTERMENTS.

Freight and passenger depots at Warren, Osseo, Mason, Barronett and Altoona, Wis., and Mendota, Minn., were replaced by new structures.

Wooden water tanks on steel towers were erected as follows:

Mondovi, Wis.	Avoca, Minn.
Marshfield, Wis.	Montrose, S. D.
Minneapolis, Minn.	Fulton, S. D.
Merriam, Minn.	Sibley, Iowa.
St. Paul Shops, Minn.	LeMars, Iowa.
	Bloomfield, Neb.

Elevated coal chutes were erected at Knapp and Rice Lake, Wis., Minneapolis and St. James, Minn., and Emerson, Neb.

The 30-stall engine house at North Minneapolis, Minn., mentioned in previous report, was completed.

The old engine house at Altoona, Wis., (with the exception of five stalls to be used for boiler room and machine shop) has been torn down and is being replaced by a 20-stall structure with turntable; in connection with this work there is being erected a sand house with tower, stand pipe and cinder pit.

An interlocking tower was erected at Northline, Wis., to replace a similar structure destroyed by fire and the interlocking plants at the Eau Claire River bridge and at the C. M. & St. P. Ry. crossing at Eau Claire, also at Camp Douglas, Wis., were remodeled to accommodate the installation of automatic block signals.

Work is in progress on a viaduct at Earl Street, St. Paul, Minn.

Automatic block signals between Elroy and Wyeville, Merrillan and Eau Claire, and Northline, Wis. and St. Paul, Minn., mentioned in previous report, were completed and placed in operation.

Automatic block signals are now being installed between Eau Claire and Northline, Wis., a distance of 63.70 miles, of which 32.80 miles were completed and placed in operation July 17, 1913. The balance of the work authorized—30.90 miles—will be completed this year, when the Company will have continuous automatic block signals of the most modern type from Elroy, Wis., to St. Paul, Minn., a distance of 194.57 miles.

Work is in progress on additional yards at Hazel Park and Minneapolis, Minn. The net increase in side tracks and yards during the year was 12.90 miles.

Electric head lights were applied to 138 locomotives during the year to comply with State regulations.

The draw span, 320 feet long, and the fixed span, 157 feet long, of the bridge over the St. Croix River at Hudson, Wis., were replaced by spans

of the same length of heavier construction; and 29 steel bridges between Eau Claire and Elroy, Wis., were replaced with heavier bridges, or strengthened by the addition of material to provide for increase in the weight of locomotives.

The length of wooden bridging was decreased 860 feet, as follows:

By construction of permanent bridges.....	574 feet
By construction of concrete pipe culverts.....	286 feet
Total	860 feet

LAND DEPARTMENT.

The net receipts from all grants, including Nebraska town lots, were \$7,390.12.

2,939.15 acres were disposed of during the year, leaving 78,644.81 acres unsold June 30, 1913.

Appended hereto may be found statements, accounts and statistics relating to the business of the fiscal year, and the condition of the company's affairs on June 30, 1913.

By order of the Board of Directors.

WILLIAM A. GARDNER,
President.

GENERAL BALANCE SHEET, JUNE 30, 1913.

1,677.50 Miles.

ASSETS.

PROPERTY INVESTMENT.

Road and Equipment:

Balance to debit of this account June 30, 1912	\$67,749,246.48
Add sundry construction and equipment expenditures for the year ending June 30, 1913	4,336,196.27
	<u>\$72,085,442.75</u>

Securities:

Securities of proprietary, affiliated and controlled companies, unpledged	206,200.00
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Other Investments:

Advances to proprietary, affiliated and controlled companies for construction, equipment and betterments	279.98
Miscellaneous investments	169,229.34

\$72,461,152.07

WORKING ASSETS:

Cash	\$2,413,442.63
C., St. P., M. & O. common stock on hand	2,844,206.64
C., St. P., M. & O. preferred stock on hand	1,386,921.66
Consolidated mortgage bond scrip due from Central Trust Company	1,046.02
S. S. M. & S-W. Ry. Co. first mortgage bonds on hand	50,000.00
Minneapolis Eastern Ry. first mortgage bonds on hand	75,000.00
Minnesota Transfer Ry. first mortgage bonds on hand	187,000.00
Bills receivable	1,955.83
Traffic and car service balances due from other companies	95,908.98
Net balance due from agents and conductors (including working funds)	527,102.74
Miscellaneous accounts receivable	403,573.22
Materials and supplies	1,629,294.89
Other working assets	1,655.20
	<u>9,619,107.81</u>

DEFERRED DEBIT ITEMS:

Advances	\$7,130.08
Other deferred debit items	501,741.33
	<u>508,871.41</u>

\$82,589,131.29

LIABILITIES.

CAPITAL STOCK.

Common stock and scrip outstanding.....	\$18,559,086.69
Preferred stock and scrip outstanding.....	11,259,911.63
	<u>\$29,818,998.32</u>
Common stock and scrip owned by the company	\$2,844,206.64
Preferred stock and scrip owned by the company	1,386,921.66
	<u>4,231,128.30</u>

MORTGAGE, BONDED AND SECURED DEBT.

Bonds outstanding	\$37,547,000.00
Bonds and scrip owned by the company	51,046.02
	<u>37,598,046.02</u>

WORKING LIABILITIES.

Traffic and car service balances due to other companies	\$350,488.72
Audited vouchers and wages unpaid	2,181,466.64
Miscellaneous accounts payable	117,962.26
Matured interest, dividends and rents unpaid	80,227.50
Other working liabilities	41,081.77
	<u>2,771,226.89</u>

ACCRUED LIABILITIES, NOT DUE.

Unmatured interest and dividends	\$1,392,197.49
Taxes accrued	542,122.25
	<u>1,934,319.74</u>

DEFERRED CREDIT ITEMS.

Reserve for accrued depreciation	\$1,321,312.99
Unextinguished premium on funded debt sold	81,251.93
Other deferred credit items	240,826.71

PROFIT AND LOSS	1,643,391.63
	<u>4,592,020.39</u>

\$82,589,131.29